Geology of North Carolina.

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Geology of North Carolina.

CHAPTER I.

MINERALOGY.

BY F. A. GENTH AND W. C. KERR.

It has seemed desirable to give in this, as in the previous volume, a compendious account of the mineralogy of the state; and the Survey has been fortunate in getting Dr. Genth, as before, to prepare the body of the chapter on this subject.

The scope of the paper has been enlarged as compared with the former "appendix," so as to include much new materials.

And in addition to the general synopsis, he has, by request, thrown his accessible materials and mineral localities into the form of a *Catalogue* of the minerals *by counties*. This brings out and emphasizes the important fact of the very wide distribution of the mineral wealth of the state.

The *mineralogical map* which accompanies the volume will make this feature of the subject still more impressive.

In 1871, (before the preparation of the appendix on minerals for the report of 1875,) Dr. Genth went over the entire collection in the State Museum, specimen by specimen, besides being taken to visit many of the most interesting mineral localities of the state. He was thus enabled to bring into view the latest discoveries in this field, and to give a complete exposition of the subject up to date. Since that time much new material has been added to the state collection, which he has not had an opportunity to examine, except in occasional instances, for the investigation of new species; and the range of occurrence of many known species, and the number of localities yielding them have been greatly extended; all these new data have been embodied. Several causes have been operative in giving a very considerable impulse to the mineral development of the state, and the addition of many new species to the list of its known minerals, some of them of great interest, and a number of them not hitherto or elsewhere discovered in America. The Mica mining industry, for example, has brought to

P 17853

light a great many new and rare species. The Mica veins carry a larger number of rare and complex combinations than those of any other description. Among the minerals of this character which a number of these mines have yielded, may be noted the following:

RARE MINERALS FOUND IN THE MICA MINES.

Samarskite,	Urarinite,	Pyrochlore,
Hatchettolite,	Allanite,	Fergusonite,
Columbite,	Gummite,	Phosphuranylite,
Beryl,	Uranotil,	Rogersite,
Æschinite,	Uranochre,	Tantalite,
Autunite,	Euxenite,	Yttrotantalite.

As an illustration of complexity of some of these mineral combinations and the variety of rare elements entering into their composition, one of the most common, *Samarskite*, contains *columbium, wolframium, tin, uranium, yttrium, zirconium, thorium and cerium;* and *Euxenite* contains *columbium, tantalum, titanium, uranium, cerium, lanthanum* and *yttrium.*

The corundum mines, in the chrysolite ledges of the mountain region, have also added to the catalogue a number of rare minerals, and some new to science. Among these are maconite, lesleyite, wilcoxite, kerrite, culsagerite, (all new), chromite, kokscharoffite, smaragdite, genthite, dudleyite, arfvedsonite, penninite, bronzite, enstatite, picrolite, spinel, deweylite, prochlorite, cerolite, fibrolite, margarite, damourite.

And the discovery of so many mineral rarities has attracted scientific and amateur explorers and collectors from all quarters, with the result of wider and more minute and systematic exploration and search for new and rare minerals. Several parties have spent months and years in this sort of exploration, and have added not only many new localities of known minerals, but a number of species of rare occurrence and great scientific (and occasionally economic) interest. Prof. John T. Humphreys, for example, has spent four years in a systematic exploration of half a dozen counties in the middle and piedmont sections of the state, and has discovered, among other things, a great many very interesting and unique forms of quartz crystals and rutiles, and has added a great number to the list of new mineral localities; all of which he has kindly communicated to me for this report. A large part of the valuable list of localities in the catalogues of Catawba and Burke we owe to him, as well as a number in Alex-

ander and elsewhere. In his extraordinary collection of quartzes, he has "one group of 13 smoky crystals, having 52 moveable bubbles and 9 basal planes, and one crystal with a basal plane and enclosing a gas, a liquid, and a solid."

Mr. J. A. D. Stevenson, of Statesville, has also discovered during the last few years a great many new and most interesting mineral localities and minerals in Iredell and Alexander, and much of the interest and value of the mineral lists for those counties is due directly or indirectly to him.

And his discoveries, and those of Prof. Humphreys, which they have generously and freely made public, for the benefit of all who might be interested, and the new discoveries in the mountains, have attracted to these fields amateurs and students, who are continuing the search with much success. Among these, Mr. W. E. Hidden, of New York, has spent many months in explorations and mining for these mineral rarities, and has himself added a number of very interesting discoveries, which are noted in the proper place. He has figured and described for me some of the novel forms of quartz crystals above referred to, and has also furnished some valuable notes of his observations and discoveries in several counties, which are inserted at the end of this chapter. Of especial interest is his investigation of the supposed *diopside* of Alexander, which turns out to be a new variety of *spodumene*, and is likely to prove a matter of commercial interest.

Dr. C. L. Hunter has also kindly furnished a list of mineral localities in Gaston, Lincoln and elsewhere.

From Mr. G. B. Hanna, of the U. S. Assay Office, Charlotte, I have also obtained quite an extended list of mineral localities of the neighboring gold region. And to Prof. A. A. Julien the survey is indebted for notes of the occurrence of notable minerals at many points in the mica mining section of the state, and elsewhere.

The present chapter includes, therefore, in addition to the materials which Dr. Genth had embodied, all the information on the subject that has been gathered from all these and many other sources, up to Dec. 16, 1880, several valuable items having been received within a few days, so that the list of North Carolina mineral species has been very considerably extended, and I have been able to add several new ones within the last few weeks.

The number given in 1875 was 140; it has now reached 178, an increase of more than 25 per cent. This is a greater number of species

P 17853

than has been discovered in any other state; and if there had been means to make a complete investigation of all the materials in hand, the number would probably have fallen little short of 200.

The first part of this chapter stands substantially as Dr. Genth prepared it, except as to about a dozen species, which I have since added, and also except a large number of localities added from the sources above mentioned, that were not accessible to him.

The second part of the chapter, *the catalogue*, has been more than doubled since it left his hands. Such has been the rapid growth of our knowledge in this department in ten years; and the indications are that the next decade will furnish the means of a still greater advance.

It is deemed of sufficient practical interest, from an economic point of view, to signalize for special note, the wide distribution of some of the more valuable metallic ores—of *gold*, *iron* and *copper*, and the associated ores of *zinc*, *lead* and *silver*.

Gold occurs almost universally wherever the rocks are not covered up by drifts, both free and in association with pyrite and chalcopyrite, &c., as will be seen by a glance at the catalogue.

Iron is found in all the sections and in nearly all the counties of the state, in some of its ores, *magnetite*, (*gray ore*,) *hematite*, (*specular*,) *limonite*, (*brown ore*,) *siderite*, (*ball ore and black band*,) &c.

Copper occurs in a majority of the counties in which the rocks (and veins) are not concealed by superficial deposits, in the common ores, *chalcopyrite* and *barnhardite*, (*copper pyrites*, or *yellow copper*,) *chalcocite*, (*copper glance*) *melaconite*, (*black copper*,) *malachite and chysocolla*, (*green copper*,) *azurite and covellite*, (*blue copper*,) *bornite*, (*purple copper*) besides *cuprite*, (*red copper*,) and many other less important ores.

Zinc occurs in many places in the ore *sphalerite* (*blende*,) commonly associated with the more common ore of Lead, viz: *galenite*, (*galena*,) which will be noted as of very frequent occurrence.

Silver is very commonly associated with gold, both the free gold of the placers (or gravels) as a native alloy, and as *argentite*, (*silver glance*,) in combination with galenite, above mentioned as the leading ore of lead, and its frequent association with copper will also be noted.

The wide distribution of many other useful minerals will be also observed at a glance; e. g. *muscovite*, (*mica*,) *chromite*, *corundum*, *calcite*, in limestone beds in the piedmont and mountain sections, and in marl beds in most of the eastern counties, *barite*, *kaolin*, &c., &c.

The following is the list of mineral species hitherto found in the State and described below:

Native Elements.

1. Gold.
2. Silver.
3. Platinum.
4. Palladium.
5. Copper.
6. Iron.
7. Lead.
8. Antimony.
9. Sulphur.
10. Diamond.
11. Graphite.

Sulphids, &c.

12. Bismuthinite.
13. Tetradymite.
14. Molybdenite.
15. Argentite.
16. Galenite.
17. Altaite.
18. Bornite.
19. Sphaleritc.
20. Chalcocite.
21. Troilite.
22. Pyrrhotite.
23. Schreibersite.
24. Pyrite.
25. Chalcopyrite.
26. Barnhardtite.
27. Marcasite.
28. Leucopyrite.
29. Arsenopyrite.
30. Nagyagite.
31. Covellite.

Sulpharsenids, &c.

32. Proustite.
33. Aikinite.
34. Tetrahedrite.

Chlorids, &c.

35. Halite.
36. Cerargyrite.
37. Ferrous chloride.

Fluorids.

38. Fluorite.
39. Yttrocerite.

Oxides.

40. Cuprite.
41. Melaconite.
42. Corundum.
43. Hematite.
44. Menaccanite.
45. Spinel.
46. Gahnite.
47. Magnetite.
48. Chromite.
49. Uraninite.
50. Rutile.
51. Anatase.
52. Brookite,
53. Pyrolusite.
54. Braunite.
55. Hausmannite.
56. Diaspore.
57. Goethite.
58. Limonite.
59. Gummite.
60. Psilomelane.
61. Wad.
62. Senarmontite.
63. Bismite.
64. Molybdite.
65. Quartz.
66. Opal.

Silicates.

67. Enstatite.
68. Pyroxene.
69. Spodumene.
70. Amphibole.
71. Smaragdite.
72. Arfvedsonite.
73. Crocidolite.
74. Beryl.
75. Chrysolite.
76. Garnet.
77. Zircon.
78. Vesuvianite.
79. Epidote.
80. Allanite.
81. Zoisite.
82. Phlogopite.
83. Biotite.
84. Muscovite.
85. Labradorite.
86. Andesite.
87. Oligoclase.
88. Albite.
89. Orthoclase.
90. Tourmaline.
91. Fibrolite.
92. Cyanite.
93. Topaz.
94. Euclase.
95. Titanite.
96. Staurolite.

Hydrous Silicates.

97. Chrysocolla.
98. Calamine.
99. Talc.
100. Pyrophyllite.
101. Stilpnomelane.
102. Glauconite.
103. Serpentine.
104. Deweylite.
105. Cerolite.
106. Genthite.
107. Kaolinite.
108. Saponite.
109. Halloysite.
110. Pinite.
111. Margarodite.
112. Paragonite.
113. Damourite.
114. Culsageeite.
115. Kerrite.
116. Maconite.
117. Penninite.
118. Prochlorite.
119. Chloritoid.
120. Willcoxite.
121. Margarite.
122. Dudleyite.
123. Uranotil.
124. Uranochre.
125. Zippeite.

Tantalates, &c.

126. Pyroehlore.
127. Hatchettolite.
128. Tantalite.
129. Columbite.
130. Yttrotantalite.
131. Samarskite.
132. Euxenite.
133. Æschynite.
134. Rutherfordite.
135. Fergusonite.
136. Rogersite.

Phosphates, &c.

137. Xenotime.
138. Apatite.
139. Pyromorphite.
140. Monazite.
141. Vivianite.
142. Olivenite.
143. Pseudomalaehite.
144. Lazulite.
145. Scorodite.
146. Wavellite.
147. Pharmaeosiderite.
148. Dufrenite.
149. Phospuranylite.
150. Autunite.
151. Nitre.

Tungstates, &c.

152. Wolframite.
153. Rhombie Tungstate of Lime.
154. Scheelite.
155. Cuproscheelite.
156. Stolzite.

Sulphates, &c.

157. Barite.
158. Anglesite.
159. Crocoite.
160. Melanterite.
161. Goslarite.
162. Chaleanthite.
163. Alunogen.
164. Jarosite.
165. Montanite.

Carbonates.

166. Caleite.
167. Dolomite.
168. Magnesite.
169. Siderite.
170. Rhodochrosite.
171. Cerussite.
172. Malachite.
173. Azurite.
174. Bismutite.

Mineral Coal.

175. Anthracite.
176. Bituminous Coal.
177. Lignite.

Organic Compounds.

178. Succinite.

PROF. W. C. KERR,

State Geologist of North Carolina :

SIR :

I beg to submit a revised list of the minerals found in North Carolina, which I have prepared in compliance with your request.

Since the publication of the first preliminary report, many species have been added, and the true nature of others has been established, but, for the want of an appropriation for this special purpose, no systematic investigation of the whole domain of mineralogy could be attempted. For this reason a great many interesting occurrences have not been studied and doubts rest on many as to their true nature, and it must be left to the future to clear up obscurities yet existing.

Instead of giving, as in the first report, merely the names and localities, I have added all the analyses of N. C. minerals which I have been enabled to find in scientific periodicals, and I have made, or had made in the Laboratory of the University of Pennsylvania, a number of others which appeared to be of importance, for the correct determination of many species.

As an appendix to the list of minerals, I have, as far as I have been able to do so, arranged them by the counties in which they are found.

The systematic arrangement is the same which was followed in the first report.

I have received generous aid in the preparation of this report by contributions of valuable specimens, and communication of new localities and suggestions from Mrs. H. A. Burdick of Franklin, Macon county, of Mr. J. A. D. Stephenson of Statesville, Prof. J. T. Humphreys of Greensboro, and others, to whom I am greatly indebted for their disinterested kindness.

From this list of the North Carolina minerals it will be observed that since the publication of the first report about eight years ago, twenty three* species have been added, which were either new, or not yet distinguished.

All of which is respectfully submitted,

F. A. GENTH.

MARCH 13th, 1880.

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*As stated on a preceeding page, this number has been increased to 38 at the date of publication, in December.

W. C. KERR.

MINERALS.

I. NATIVE ELEMENTS.

1. Gold.

Gold occurs in numerous localities throughout the State, generally in quartz veins of the gneissic, granitic and dioritic rocks, also in those of the talcose, chloritic and argillaceous slates, and in beds of the slates themselves, and in gravel deposits, the debris of the decomposed rocks and veins. The principal counties in which it has been found in sufficient quantity for exploitation are: Franklin, Nash, Granville, Alamance, Chatham, Moore, Guilford, Davidson, Randolph, Montgomery, Stanly, Union, Cabarrus, Rowan, Mecklenburg, Lincoln, Gaston, Catawba, Caldwell, Burke, McDowell, Rutherford, Polk, Cleaveland, Cherokee, Jackson, Transyvania and Watauga.

It is generally more or less alloyed with silver, varying from pure gold on the one side to pure silver on the other. Near the surface it is usually associated with limonite and at a greater depth of the deposits with pyrite, chalcopyrite, galenite, zincblende, tetradymite, arsenopyrite, rarely with altaite and nagyagite. Specimens of gold, remarkable for their size, have been found at the Reid Mine, in Cabarrus county, the Crump Mine and the Swift Island Mine, in Montgomery country, (at the latter place in plates, covered with octahedral crystals,) at the Cansler & Shuford Mine, in Gaston county, and the Little John Mine, in Caldwell county, and Pax Hill in Burke county. Very beautiful arborescent gold has been obtained from the Shemwell vein in Rutherford county. The variety, "electrum," containing from 36 to 40 per cent. of silver, has been met with in octahedral crystals at Ward's Mine, in Davidson county; also, in Union county, at the Pewter Mine, and associated with galenite and zincblende at the Stewart and Lemmond mines, and in the neighborhood of Gold Hill Rowan county.

According to Dr. Asbury, very interesting specimens have been found at Silver Hill, when the mine was first opened, consisting of lumps of several inches in length, one end of which was pure gold, while the other was pure silver. None of them have been preserved.

2. Silver.

This is, on the whole, a rare mineral in North Carolina. It has been obtained in considerable quantities at Silver Hill, in its native state, foliated and in plates in cerussite, also associated with argentite, galenite, zincblende, in small lumps, and arborescent and filifirm masses; it has also been found in small plates and reticulated masses, associated with tetrahedrite and zincblende, at the McMakin Mine, in Cabarrus county; two specimens of laminated silver have been observed by Dr. Asbury at the Asbury Mine, in Gaston county; it has also been found by Hon. C. J. Cowles, of the Charlotte Mint, associated with chalcocite, at Gap Creek Mine, Ashe county, and rarely with the gold ores of Scott's Hill, Burke county.

3. Platinum.

The occurrance of grains of platinum among the sands of gold-washings of Rutherford and Burke counties, was first brought to notice by General Clingman, who sent half a dozen grains from a mine, near Jeanestown, to Prof. C. U. Shepard. It has also been found on Brown Mountain, in Burke, northwest of Morganton, on Gen. R. F. Hoke's land. It is reported as having been found near Burnsville, Yancey county.

4. Palladium.

General Clingman sent a specimen to Prof. C. U. Shepard, which came probably from Burke or Rutherford county, which the latter pronounced "native palladium."

5. Copper.

It has been found in small quantities in several mines, principally near the surface, so in minute distorted crystals with limonite at the McCulloch Mine, in Guilford county, arborescent and in crystalline plates at the Union Copper Mine, in Cabarrus county, near Gold Hill; one lump of copper, about two inches in size, much resembling that from the Cliff Mine, Lake Superior, said to have been found in Stokes county, is in the Museum at Raleigh; it also occurs in quartz and epidote-rock at Harris mountain, one-half mile east of Gillis Mine,

Person county, and at Wolf Creek Mine, Jackson county, and Ore Knob, Ashe county. A very interesting association is that of native copper in quartz crystals from lower Mecklenburg county, as observed by Mr. E. Bissell.

6. Iron.

No terrestrial native iron has been observed in North Carolina, but a great number of highly interesting meteoric masses have been found in the State; many of them have been preserved through the industrious perseverance of General Clingman, and were described by Prof. Shepard. The meteorites found were both irons and stones. They are :

1. The Caswell county iron, which fell on January 7th, 1880; it weighed three pounds, and was described by Madison.

2. The Guilford county iron was found in 1820; weighed twenty-eight pounds, and was described by C. U. Shepard in 1841.

3. The Randolph county iron was found in 1822, and weighed about two pounds; it was described by C. U. Shepard; it is highly crystalline, distinctly foliated and presents thin much interlaced laminæ. When polished and etched it shows very fine almost invisible feathery lines, much resembling hoar-frost on a window pane. It is, according to Shepard, pure iron with cobalt only in traces. It has a hardness like the best tempered steel, and a spec. gravity = 7.618.

4. The Black Mountain iron, from the head of the Swannanoa river, 15 miles east of Asheville. It weighed 21 ounces and is evidently a a fragment from a larger mass. It is highly crystalline, laminated, the laminæ being about one-tenth of an inch in thickness and arranged parallel to octahedral planes. Sulphide of iron being inclosed between the laminæ renders it subject to rapid weathering. The analysis by C. U. Shepard gave

Iron,	96.04
Nickel with trace of cobalt,	2.52
Insoluble, sulphur and loss,	1.44

Spec. Grav. 7 261.

It was discovered in 1835.

5. The Asheville iron, discovered in 1839 on Col. Baird's plantation near the French Broad river, six miles north of Ashville; it weighed about thirty pounds. It contains chloride of iron.

6. The Buncombe county iron, found in 1845 and described by C. U. Shepard in 1846, weighed about twenty-seven pounds.

7. The Hominy Creek iron, near the base of Pisgah Mountain, ten miles west of Ashville. It weighed between five and six pounds. It is vesicular near the surface, and is said to contain chrysolite, and becomes more compact towards the central portion. The polished and etched portions of the compact meteorite shows the most delicate Widmannstædtean figures, consisting of very minute and thickly interspersed triangular figures. Spec. grav. 7.32. The analysis by Clark gave

Iron,	93 225
Nickel (cobalt),	0.236
Iron, Nickel, Phosphorus and Graphite,	4.765
Copper and Tin,	0.099
Sulphur,	0.543
Silicon,	0.501
Magnesium, Manganese,	traces.
	99.369

8. The Madison county iron, from Jewel Hill. Several masses have been found; one in 1857, which weighed about forty pounds, and which seems to have disappeared, if that described by J. L. Smith of eight pounds and thirteen ounces, of which he says it had been discovered in 1856, is not a portion of it. The other found in August, 1873, about one mile east of the first, has been analyzed by B. S. Burton. It weighed when found twenty-five pounds. It shows indistinct Widmannstædtean figures on etching, and has a spec. grav. of 7.46. Both masses show constant deliquescence from chloride of iron.

The analyses gave:

	J. L. Smith.	*B. S. Burton.*	
Iron,	91.12	94.24	
Nickel,	7.82	5.17	
Cobalt,	0.43	0.37	
Phosphorus,	0.08 insoluble	0.15	(Silica, Iron, Nickel, Chrome and
Copper,	trace.	trace.	[Phosphorus.
	99.45	100.07	

9. The Haywood county iron, described by Shepard, weighed only $\frac{1}{8}$ of an ounce. It is highly crystalline; when polished and etched shows brilliant Widmannstædtean figures; it is also irregularly veined

by a black mineral, which appears to be magnetite. Spec. grav. 7.419 Contains Iron. Nickel, Chrome and Phosphorus.

10. The Rockingham county iron, from Smith's Mountain, two miles north of Madison, found 1866 in an old field, grown up with pines, but cultivated ten or fifteen years previously. It fell probably in the interval. The original weight was 11 pounds, the greater portion of which is preserved in the museum at Raleigh. It is highly crystalline and on etching gives fine Widmannstædtean figures, showing that it consists of probably three different kinds of iron. Contains also Schreibersite in short, very minute quadratic crystals, and, according to J. L. Smith, *solid* chloride of iron. Spec. grav. 7.78. It has been analyzed by me and J. L. Smith as follows:

		Genth.	*Smith.*
Iron,		90.41	90.88
Nickel,		8.74	8.08
Cobalt,			0.50
Copper,		0.11	0.03
Insoluble Phosphide,	Iron,	0.27	
	Nickel (Cobalt),	0.33	
	Phosphorus,	0.14	0.03
		100.00	99.46

11. The Cabarrus county stone fell on Oct. 31st, 1849. It weighed 18½ pounds and was an irregularly shaped mass resembling a truncated foursided pyramid on the base a rounded undulatory surface, coated with a black coherent crust. Tough. Color dark blueish grey, mottled with grains and crystals of lighter color. In structure subporphyritic. Spec. grav. 3.60—3.66.

According to C. U. Shepard it contains:

Niccoliferous iron (with chrome,	6.320	Alumina,	1.797
Sulphide of iron,	3.807	Lime, Soda, Potash and loss	3.394
Silicic acid,	56.168		
Ferrous oxide,	18.108		100.000
Magnesia,	10.406		

12. The Nash county stones fell May 14th, 1874, near Castalia. Perhaps a dozen or more stones fell, of which three have been found, one of over 12 pounds, the others of 2⅛ and 1$\frac{8}{10}$ pounds. They have a dull black coating and consist of darker and lighter portions. Spec. grav. 2.601. The analysis by J. L. Smith shows that it is composed of

Niccoliferous iron,	15.21
Stony mineral,	84.79
The niccoliferous iron contains:	
Iron,	92.12
Nickel,	6.20
Cobalt,	0.41
Copper and Phosporus not determined.	
	98.73

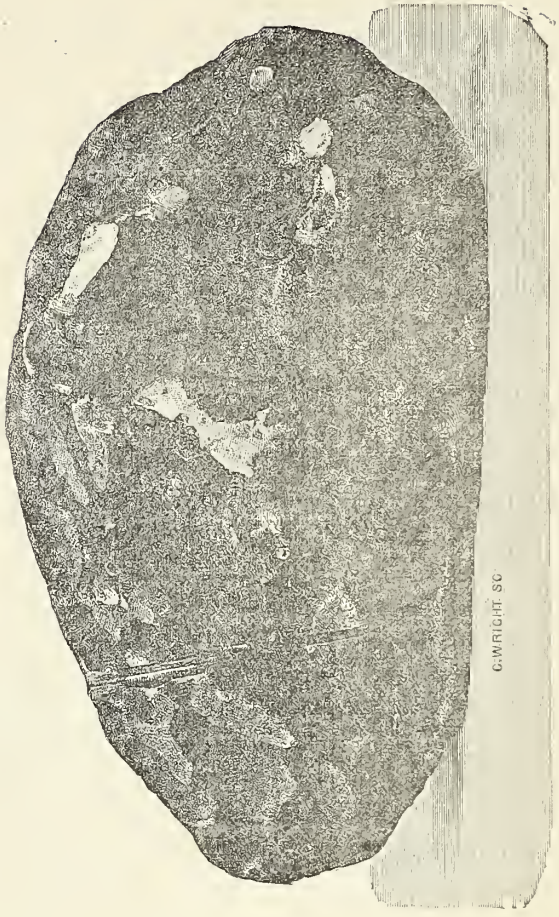
The stony portion is partly soluble in acids, leaving 47.2 p. c. undissolved:

	Insoluble part:	Soluble part:
Silicic acid,	52.61	38.01
Alumina,	4.80	0.46
Ferrous oxide,	13.21	17.51
Magnesia,	27.31	41.27
Soda with traces of potash,	1.38	.....
Sulphur,	.....	1.01
	99.31	98.26

The insoluble portion is mostly bronzite; the soluble, chrysolite, with small particles of anorthite and enstatite.

13. A peculiar substance, consisting principally of iron and silicon, supposed to be of meteoric origin, has been found near Rutherfordton. Shepard described it and called it "ferrosilicine."

14. The Davidson county iron was recently identified by W. E. Hidden. The accompanying figure, of which the plate was kindly loaned to the Survey by the editors of the *American Journal of Science*, at H.'s request, will show its size and shape:



DAVIDSON COUNTY METEORITE.

The following is his description: "On the 19th of July, 1879, while Mr. Gray W. Harris was prospecting for gold on his plantation near Lick Creek, Davidson county, he found in a ditch, a nugget of what appeared to him to be silver. It was covered with a thick, scaly crust of iron oxide; weighed two and three-fourths pounds ($2\frac{3}{4}$ lbs.); was pear shaped, measured $4\frac{1}{2}$ by $2\frac{1}{2}$ inches over its broadest surface, and about one inch in thickness. Wherever cut or hammered it showed a white metallic mass under laying the red crust.

This iron has been analyzed by Dr. J. Lawrence Smith and J. B. Mackintosh, E. M. I here give the average of four closely agreeing analyses:

Iron,	93.00	per cent.
Nickel,	5.74	" "
Cobalt,	0.52	" "
Phosphorus,	0.36	" "
Total per cent	99.62	

Traces of sulphur, chlorine and copper; carbor. not determined.

This iron does *not* show the customary Widmannstædtean figures."

7. Lead.

A few small irregular lumps of what has been alleged to be "native lead," were received from Messrs. Bechtler, of Morganton. They were said to have been dug up four miles north of Morganton, in making a road near the Catawba river.

8. Antimony.

A small piece of native antimony was received from Dr. Hunter. It is quite pure and free from arsenic, but coated with a crust of antimonic oxide. From a small vein in Burke county.

9. Sulphur.

It is frequently met with in minute cyrstals in cellular quartz, filling the cavities formerly occupied by pyrite, in Cabarrus, Mecklenburg, Gaston, Caldwell, Surry and Stokes counties; it also occurs diffused through the interstices of a white quartzose sandrock in Lincoln county.

10. Diamond.

This rare gem has been repeatedly found in North Carolina, and the following occurrences have been well established. In every instance it was found associated with gold and zircons, sometimes with monazite and other rare minerals in gravel beds, resulting from gneissic rocks, but it has never been observed in the North Carolina *itacolumite* or any debris resulting from its disintegration. The first diamond was found in 1843 by Dr. M. F. Stephenson, of Gainesville, Georgia, at the ford of Brindletown creek. It was an octahedron, valued at about one hundred dollars. Another from the same neigh-

borhood came into possession of Prof. Featherstonehough, while acting as United States Geologist.

The third diamond, at Twitty's Mine, Rutherford county, was observed in 1846, by General Clingman, in D. J. Twitty's collection, and has been described by Prof. Shepard. Its form is a distorted hexoctaheron, and its color yellowish.

The fourth came from near Cottage Home, in Lincoln county, where it was discovered in the spring of 1852, and was recognized by Dr. C. L. Hunter. It is greenish and in form similar to the last, but more elongated.

A very beautiful diamond was found in the summer of 1852 in Todd's branch, Mecklenburg county. It was nearly of the first water and a perfect crystal. It was in possession of the late Dr. Andrews, of Charlotte. Dr. Andrews informed me that a very beautiful diamond of considerable size, like a small chinkapin, and of black color, had been found at the same locality, by three persons, while washing for gold. In their ignorance, believing that it could not be broken, they smashed it to pieces. Dr. Andrews tested the hardness of a fragment, which scratched corundum with facility, proving it to be a diamond.

A very beautiful octahedral diamond of first water has been found many years ago at the Portis' Mine, Franklin county. There is a report that a second one has been found at the same locality.

A small diamond was also found a few years ago in McDowell county, on the head waters of Muddy Creek.

10. Graphite.

Graphite has been found at numerous localities. It forms large beds in the gneissoid and micaceous schists; sometimes very minute scales are disseminated through the gneissic and micaceous, and occasionally the limestone rocks. In most places it is impure and gritty, at others purer and better varieties have been obtained. The largest beds occur in Wake county, others in Lincoln, Cleaveland, Catawba, Alexander, Stokes, Surry, Wilkes, Person, Alleghany, Johnston and Yancey counties.

II. COMPOUNDS.

1. *Sulphids and Tellurids of metals of the sulphur and arsenic groups.*

12. Bismuthinite.

In very minute crystals and specks in the chloritic slate associated with gold, chalcopyrite and pyrite at the Barnhardt vein of Gold Hill, Rowan county.

13. Tetradymite, var. 2. sulphurous.

This rare mineral has been found associated with gold in quartz at David Beck's Mine, five miles west of Silver Hill, and at the Allen Mine, in Davidson county; also, in minute scales in Cabarrus county, at the Phœnix Mine, Boger Mine, Cullen's Mine, at the Asbury vein, in Gaston county, at Capt. Mills' Mine, in Burke county, and Capt. Kirksey's, McDowell county.

I have analyzed the tedradymite from Davidson county, and that from the Phœnix Mine, Cabarrus county, after deducting quartz and gold, and found

	Davidson Co.	*Phœnix Mine.*
Tellurium,	33.84	36.28
Sulphur,	5.27	5.01
Selenium,	trace.	.....
Bismuth,	61.35	57.70
Copper,	.....	0 31
Iron,	.....	0.54
	100.46	99.94

14. Molybdenite.

In granite and quartz veins, in fine scales in the neighborhood of the Pioneer Mills Mine, Cabarrus county; also, in Guilford county, and at Peach Bottom M., Alleghany county, at Haskett's, Macon county, and in many other places west of the Blue Ridge.

II. SULPHIDS, &C., OF METALS OF THE IRON, GOLD AND TIN GROUPS.

15. Argentite.

In small grains, associated with native silver, in the ores of Silver Hill, Davidson county, and the McMakin Mine, in Cabarrus county, also in slates of Montgomery county. (Emmons.) Found also at the Cheek M., Moore county, and at Higdon's M., in the Cowee Mts., and in Swain county.

16. Galenite.

At Silver Hill sometimes in highly argentiferous, crystalline, bluish grey masses, also coarsely and finely granular. In coarse grained masses at the Hoover Mine and Boss Mine, in Randolph county, and the McMakin Mine, Cabarrus county, in small quantities at Miller's Mine, Baker Mine and Little John Mine, in Caldwell county, at Pax Hill, in Burke county, in Alexander county, at Cansler & Shuford Mine, the Asbury Mine and King's Mountain Mine, and at Crowder's Mountain Barite Mine, and at the Oliver M, in Gaston county; highly auriferous and argentiferous galenite occurs at the Stewart Mine, Lemmond M., Phifer M., Smart M., Moore M., and at the Crowell M., and elsewhere in Cabarrus, and at Long M. in Union county, at the Cheek M., Moore county; with copper ores it is found at the Clegg's and Williams' Mines, in Chatham county; the Peach Bottom Mine, in Alleghany county; at Marshall, in Madison county, with gold at Murphy, Cherokee county, and in Lincoln, Macon, Swain and Surry. Specimens of fine grained galenite have also been obtained from Beech Mountain, in Watauga, and on Elk creek, Wilkes county, at the Steele Mine, Montgomery county, and at the Crowell M. and elsewhere in Cabarrus county.

17. Altaite.

This exceedingly rare mineral occurs associated with gold, nagyagite, galenite, etc., at King's Mountain Mine, Gaston county.

18. Bornite or variegated Copper Ore.

I have crystalline specimens of bornite from Guilford county, probably from the Gardner Hill Mine; it is of somewhat rare occurrence in North Carolina, but has been found with other copper ores at Clegg's Mine, in Chatham county, Marshall, in Madison county, Peach Bottom, Alleghany county, and the Gap Creek Mine, Ashe county, and near Concord, Cabarrus county, and at Well's farm, in Gaston.

19. Sphalerite or Zincblende.

This mineral occurs in quantities sufficient for exploitation only at a few mines. The principal localities are Silver Hill and Silver Valley, in Davidson county, and the McMakin Mine, in Cabarrus county, where it is found associated with silver ores; associated with gold ores at Stewart, Lemmond, Long and Moore Mines, and rarely at the Union Mine, in Union county; in limestone at Dobson's Mine, Cedar Cove, McDowell county, and in Macon county; in small quantities with other ores at King's Mountain Mine, in Gaston county; at Clayton, in Johnston county, near Marshall, in Madison county, and on Uharrie river, Davidson county, at the Steele Mine, Montgomery county, at Peach Bottom M., Alleghany county, Crowder's Mountain, Gaston county, and the Smart M., Union county.

20. Chalcocite.

This is also a copper ore, but rarely met with in the State. The massive variety has been found at the Ore Knob Mine, in Ashe county; also, associated with bornite at Gap Creek Mine, Ashe county, the Waryhut and Wolf Creek Mines, in Jackson county, the Gillis Mine, and Mill Creek M., in Person county; also, at the Pioneer Mills Mine in Cabarrus, at A. Nichol's, in Swain, and in Guilford county, as a product of the alteration of other copper ores, and rarely with silver ores at Silver Hill.

21. Troilite.

Interlaminated with the meteoric iron from the Black Mountain, Buncombe county.

22. Pyrrhotite.

Compact pyrrhotite is found at the bottom of the Asbury shaft in Gaston county, also associated with chalcopyrite at the Elk Knob Mine, Ashe county, and on E. Fork and W. Fork of Pigeon River, Haywood county, and in Transylvania county, and near Hickory in Catawba county, and at Thorn Mtn, M., Macon county, and in Surry and Wilkes, (Trap Hill.)

23. Schreibersite. (Rhabdite.)

This mineral, of meteoric origin, has been observed in minute quadratic prisms of great brilliancy in the meteoric iron of Smith's Mountain, Rockingham county, and in less distinct particles in all the meteoric irons.

24. Pyrite.

Pyrite is one of the most common minerals of North Carolina. It is not only found in globular and irregularly shaped crystalline masses in many of the marl beds of the eastern counties, but many of the gneissoid rocks and slates and the traps contain it in considerable quantities, and besides, it is found in almost every mine of the State. In Cleaveland and Rutherford it is a common constituent of the feldspathic, slaty gneisses, disseminated in minute grains, and its ready oxidation rapidly disintegrates the rocks, so that during the late war, copperas was extensively and cheaply manufactured here by simply breaking and heaping the half decomposed fragments of rock in hoppers, leaching and crystallizing. In the gold mines the associated pyrite is generally auriferous. Cubical crystals occur at Hickory, Catawba county, Asbury Mine, Gaston county, Soapstone Quarry, twelve miles northeast of Statesville, Silver Hill, Gold Hill and many other localities. Combinations of cubes and octahedra are found in Clegg's Mine, Chatham county, and in the Guilford county gold and copper mines; the pyritohedron, often in combination with cubical and octrahedral planes, is found at the Stewart Mine, in Union county, Cambridge Mine, Guilford county, Long Creek Mine, Gaston county, Rudesill Mine, Mecklenburg county, etc. Large veins of compact pyrite occur in Gaston county.

25. Chalcopyrite.

This is very abundant, and, indeed, is the only reliable copper ore in North Carolina. It has been found in fine crystals at the Gardener Hill Mine, probably also at other copper mines of Guilford county. It is very abundant and largely mined at Ore Knob, Ashe county, and promised to be the ore of all the gold mines, which in depth change into copper mines in Guilford, Cabarrus and Mecklenburg counties; also at the Clegg Mine, in Chatham county, the Conrad Hill and the Emmons and other mines in Davidson county; Peach Bottom and elsewhere, Alleghany county, and at Gap creek, Ashe county, Newlin's Mine, Alamance county, in Alexander, in the gold mines of Union, Rowan and Gaston counties, and at Macpelah church, in Lincoln county, in Granville and Chatham counties, near Hillsboro and near Chapel Hill, Orange county, near Raleigh, in Wake county, in Surry, Wilkes (Trap Hill), Yadkin, Watauga, and Swain counties, and some of the mica mines of Mitchell county—the copper mines of Macon and Jackson counties; in more than thirty counties, and hundreds of localities; at many of them it is found associated with other ores.

26. Barnhardtite.

A peculiar and rich copper ore, first noticed on Daniel Barnhardt's land, and then at the Pioneer Mills Mine, in Cabarrus county. It also occurs at the Cambridge Mine, in Guilford county, and at the Wilson Mine and the McGinn Mine, in Mecklenburg county, and at Elk Knob, Watauga county. The true barnhardtite occurs in compact masses—having, on a fresh fracture, a very pale bronze yellow color, but rapidly tarnishing with brownish pinchbeck, also with rosered and purplish colors. That from Dan. Barnhardt's land has been analyzed by W. J. Taylor—that from Pioneer Mills by me and P. Keyser.

	Taylor.	*Genth.*	*Keyser.*
Copper	47.61	46.69	48.40
Iron	22.23	22.41	21.08
Sulphur	29.40	29.76	30 50
Silver	trace.	.....	.....
	99.24	98.86	99.98

There occurs at the Pioneer Mills, associated with the barnhardtite, another copper ore, which appears to be uniform in composition and does not look like a mixture. It is paler than copper pyrites and contains, according to the analyses of W. J. Taylor and Charles Froebel,

	Taylor.	*Froebel.*
Copper	40.2	40.5
Iron	28.4	28.3
Sulphur	32.9	31.1
	101.5	99.9

27. Marcasite.

According to the information received from Dr. Asbury, of Charlotte, this mineral occurs in Iredell county.

28. Leucopyrite.

It has been observed by Dr. Asbury, at the Asbury Mine, in Gaston county, in nodular masses almost completely altered into scorodite at Dr. Halyburton's, in Iredell county, and Drum's farm on White Plains, Alexander county.

29. Arsenopyrite or Mispickel.

It occurs sparingly in North Carolina, and has been observed in minute crystals, associated with gold ores, at the Lemmond and Stewart Mines, Union county, and at the Barringer Mine, and George Ludwick's Mine, in Cabarrus county. It has been found by General Clingman, in Cleveland county, and by Dr. Asbury, at Ore Knob Mine, in Ashe county, the Honeycutt vein at Gold Hill, and highly auriferous at the Asbury Mine, in Gaston county. It also occurs near Cooke's Gap, Watauga county, in fine crystalline particles, disseminated through siliceous rock.

30. Nagyagite.

This exceedingly rare mineral, which heretofore has been known only from Transylvania, in Hungary, occurs sparingly in minute crystals and foliated particles at the King's Mountain Mine, where it is associated with altaite, gold, etc.

31. Covellite.

Resulting from the decomposition of chalcopyrite and associated with it, covellite occurs at several of the North Carolina copper mines, for instance at the Phœnix Mine, &c., in Cabarrus county; in fine scales at the Gillis Mine, and Mill Creek Mine, in Person county.

3. *Sulpharsenids, Sulphantimonids, etc.*

32. Proustite(?)

Microscopic crystals of a bright aurora red color occur with talc, rhodochrosite, etc., at the McMakin Mine. As they are rich in silver they are probably proustite.

33. Aikinite(?)

A mineral containing sulphur, bismuth, lead and copper, and therefore probably aikinite, has been observed in small particles in quartz associated with chalcopyrite at Col. White's Mine, Cabarrus county.

34. Tetrahedrite.

Two varieties of Tetrahedrite are found in North Carolina, the highly argentiferous (Freibergite,) in small compact patches of subconchoidal fracture and a dark, grey color, associated with silver, sphalerite, galenite, talc, magnesite, &c. At the McMakin Mine, Cabarrus county, and the other in the same county at Geo. Ludwick's Mine, fourteen miles northeast of Concord, rarely cystallized but mostly massive and of a dark lead grey to iron color. It is associated with chalcopyrite, scorodite, arseniosiderite, &c., in a quartz vein. I have analyzed the tetrahedite from the McMakin Mine, which contains

Sulphur,	25.48
Antimony,	17.76
Arsenic,	11.55
Copper,	30.73
Iron,	1.42
Zinc,	2.53
Silver,	10.53
	100.00

There is probably an occasional small admixture of argentiferous tetrahedrite with the minerals associated with the native silver of Silver Hill, as they sometimes give before the blowpipe incrustations antimony.

III. COMPOUNDS OF CHLORINE, ETC.

35. Halite or Common Salt.

Found in the waters of the Atlantic Ocean, from which it can be obtained by evaporation, and in wells and springs at several points in the Triassic beds, e. g. in Chatham, Orange and Rockingham counties.

36. Cerargyrite.

In some of the gold ores of Scott's Hill, in Burke county, silver is found after roasting; a specimen, which I had an opportunity to examine, makes it probable that it is present as chloride of silver or cerargyrite.

37. Ferrous Chloride.

It has been observed in the meteoric irons from Asheville, from Jewel Hill, Madison county, which are wet from the deliquescence of this salt. In the Rockingham county iron it has been found in the solid state.

IV. FLUORINE COMPOUNDS.

38. Fluorite.

According to General Clingman, fluorite occurs at Brown Mountain, Burke county, also in Watauga, and with barite below below Marshal, Madison county, and at King's Mountain, Gaston county. In pseudomorphs after apatite rarely at Ray's Mine, Yancey county.

39. Yttrocerite (?)

A few minute deep violet blue spots were observed in association

with pyrochlore, black tourmaline, orthoclase, quartz, etc., at Ray's Mica Mine, Hurricane Mountain, Yancey county, which are probably yttrocerite.

V. OXYGEN COMPOUNDS.

1. *Oxides.*

40. Cuprite.

Cuprite or the red oxide of copper occurs in some of the copper mines near the surface. It is rarely found in small cubical crystals at Cullen's Mine and in octahedra upon native copper at the Union Company Copper Mine, in Cabarrus county. It has been observed at Clegg's Mine, Chatham county, at Silver Hill, at the Harris Mine, in Person county, in Caldwell, Lincoln, Alleghany, and Ashe counties, and upon the gossan of the Waryhut Mine, Jackson county. At the McGinn Mine, in Mecklenburg county, and several of the Guilford county copper mines, cuprite in acicular and capillary crystals (so-called chalcotrichite) was formerly found in beautiful specimens.

41. Melaconite.

It is found occasionally as a black coating or a powder associated with cuprite at the McGinn Mine, and with zincblende, etc., sparingly at Silver Hill; also at Cullowhee Mine, Jackson county.

42. Corundum.

One of the most interesting minerals, which occurs in the State of North Carolina, in a great many varieties is corundum. It was first noticed when, in the spring of 1847, a large mass of dark blue, cleavable variety, was found three miles below Marshall, in Madison county. General Clingman's attention having been called to it, he searched for more and obtained, in 1848, a second piece of about half the size. It has since been found two and a-half miles north of Marshall, at Haynie's, associated with margarite and rutile. It was afterwards found by Dr. C. L. Hunter, in small quantity, reddish and bluish masses, sometimes crystallized at Crowder's Mountain, and afterwards at Clubb's Mountain, and King's Mountain, Gaston county. About ten

years ago, large beds of corundum were discovered by Hiram Crisp, near Franklin, in Macon county, at Culsagee or Corundum Hill. Here it lies of a thickness from ten to fourteen feet, imbedded in prochlorite between chrysolite and hornblendic gneiss. The corundum itself presents many varieties. Beautiful hexagonal pyramids with the basal and rhombohedral planes and of many shades of color, from almost colorless to yellow and deep red, rarely to green, have been found. Some of the crystals are very large, one for instance measured five feet, two inches in length. Mostly, it occurs massive, often in large, cleavage masses, often of variable colors, some are red and semi-transparent and in small fragments even transparent and form a fair ruby, other specimens of reddish or grey corundum have disseminated through the mass the most beautifully colored azure blue sapphire. Unfortunately, the particles of the red and blue are too small to have any value as gems. A very peculiar variety is that consisting of white and blue bands. At this locality corundum is associated with prochlorite, black and greenish, black spinel, tourmaline, small quantities of rutile, &c., and where it occurs in the mica schist, with damourite and margarite.

Other localities in Macon county, where corundum is mined, are the Jacob's and Haskett's Mines, on Ellijay Creek, and at Robinson's Mine on Sugartown Fork. It is also found at Houston's Mine, and at Moore's & Higdon's.

At the Hogback Mine, in Jackson county, corundum associated with damourite, margarite and tourmaline is imbedded in chlorite. At the hanging wall feldspar with crystals of corundum is met with. A small quantity not exceeding a few ounces of corundum has been found near the chrysolite out-crop at Webster, Jackson county, and also on Scott's Creek. At Cullakenee Mine, in Clay county, a greyish white corundum is found associated with margarite, zoisite, actinolite, &c., and a red variety, sometimes of a deep ruby color associated with zoisite, smaragdite, cyanite and a feldspar.

At Penland's on Shooting creek, in Clay county, corundum is found associated with margarite and willcoxite. It is also occurs in Cherokee on Valley river.

In Haywood county, two miles northeast of the Pigeon river, where the Asheville road crosses it, near a serpentine out-crop a small quantity of corundum has been found, also on west fork of Pigeon. About two miles north of this, the Presley Mine is located, which has

furnished the most beautiful specimens of blue and greyish blue corundum, associated with damourite and albite.

About twenty miles northeast of this mine, in Madison county, is the Carter Mine, which yields a white and pink variety of corundum, both in crystals and laminated masses. It is associated with greenish black spinel and prochlorite.

Corundum is found also in Mitchell county, near Bakersville, in chrysolite.

In the broad-bladed cyanite of Wilkes county, corundum is met with in small reddish brown particles, and in the cyanite of the Swannanoa Gap, in Buncombe county, blue, bluish, white and reddish corundum. Also at N. P. Watkins, in the same county.

It is found in the gravel two miles west of Statesville, in Iredell county, associated with cyanite, but rarely imbedded in it. Highly interesting crystals and crystalline masses of greyish white corundum more or less altered into damourite and tourmaline have lately been found by Mr. J. A D. Stephenson, at Belts' Bridge, and beautiful hetagonal prisms of a pale brownish corundum, with a partial alteration into soda margarite, at Hendrick's farm near Belts' Bridge, Iredell county. Crystals of corundum surrounded by fibrolite occur at Shoup's Ford, in Burke county. It is also reported from Stokes county. In the neighborhood of Morganton corundum is found in damourite schist, and in the gravel deposits of Burke, McDowell and Rutherford counties small grains and crystals, often partially altered into damourite, are frequently met with. The granular variety of corundum, "Emery," has been observed at Crowder's Mountain and also in the titaniferous iron ore belt near Friendship, Guilford county. The associated minerals of corundum are mostly the result of the alteration of corundum, which latter has furnished the alumina necessary for their formation.

43. Hematite.

Red oxide of iron or hematite is one of the most important iron ores of North Carolina. The compact ore, sometimes more or less mixed with the specular variety, forms large beds in Chatham county, at Evans' and Kelley's ore beds, Ore Hill, Buckhorn, etc.; also in Moore county, twelve miles east of Carthage, and in Orange county, at Chapel Hill, six miles south of Hillsboro, and at J. Woods', Knapp of Reeds, and in Macon and Swain, Buncombe and many other counties.

Foliated and micaceous hematite occurs at Buckhorn, Ore Hill, seven miles west of Lockville, in Chatham county, Snow Creek, Stokes county, four miles south of Salem, in Forsyth county, at Mt. Tirzah, in Person county, near Gudger's, nine miles below Marshall, on the French Broad river, and near Franklinville, Randolph county, and elsewhere. A very fine variety of slaty hematite with crystals of magnetite is found at Cooke's Gap Watauga county, and both here and at Richlands, in Caldwell county, and near Fisher's Peak, in Surry county, martite occurs. Other localities are: Smith's river, two miles east of Morehead's factory in Rockingham county; a granular variety one mile east of Gaston; at House's mill, Cabarrus county; at Hickory, Catawba county, in Lincoln, Gaston and Mecklenburg counties, etc. The ocherous variety has been observed in Buncombe county, four or five miles west of Asheville, at Valley Town and on Peachtree creek, Cherokee county, and in a great many gold mines. Heagonal scales of hematite in crystals of quartz occur at King's mill, Iredell county.

44. Menaccanite.

Many of the titaniferous iron ores are mixtures of true magnetite and menaccanite, others belong to this species and others again are really magnetites, in which a portion of the iron is replaced by titanium. Our present knowledge of these ores is too limited to put all the varieties, occurring in the State, with certainty at the place where they belong. Those from the following localities, appear to belong under this head: Franklin, in Macon county, Big Laurel, in Madison county, on Ivy, Yancey county, Crab Orchard, Cane Creek, Flat Rock and Grassy Creek in Mitchell county, Damascus, Iredell county, Old Harris Mine, twelve miles southeast of Charlotte, south end of Crowder's Mountain and at Wills', Gaston county, Yadkin river, near Patterson, in Caldwell county, and the neighborhood of Raleigh. Menaccanite in quartz occurs at Fisher Hill, Guilford county. Iserite is frequent in the gold sands of Rutherford, Burke and McDowell counties, &c. Menaccanite also occurs at Shoup's Ford, Burke county, at Huffman's, Catawba county, at Culsagee, Macon county, at Haynie's, Madison county, and in Person, Watauga and Lincoln counties. I have recently analyzed a variety of black, somewhat granular, menaccanite from near Franklin, Macon county, and found it to contain

Titanic Acid	48.64
Ferri Oxide	9.76
Ferrous Oxide	40.22
Magnesia	1.38
	100.00

45. Spinel.

The only spinel which has been found in North Carolina, is that which results from the alteration of corundum, and it is usually a mixture, in variable proportions, of the varieties *pleonaste* and *hercynite*, sometimes with an admixture of that called *picotite*. In the chlorites of the Culsagee Mine it is found in octahedral cyrstals with dodecahedral plannes, but usually massive, coarsely to finely granular. Its color is black but by an incipient alteration on the surface generally of a peculiar greenish grey color and satin-like lustre. Some varieties are blackish green, but so dark that the green can only be observed in thin splinters; it is rarely found at the Cullakenee Mine in Clay county, but frequently met with at the Carter Mine in Madison county, where it is mostly of a very dark green color. Several varieties from Culsagee Mine have been analyzed. 1. A fine grained variety of 3.766 spec. gr. by G. A. Koenig; 2, a coarser grained variety of 3.797 spec. gr. by the same; and 3, the coarse grained crystallized dark green, of 3.695 spec. gr. by myself. They contained, after deducting some mechanical admixtures, as follows:

	1. *Koenig.*	2. *Koenig.*	3. *Genth.*
Alumina,	54.32	56.58	66.63
Chromic Oxide,	3.96	2.28	trace.
Ferric Oxide,	11.51	9.66	1.80
Ferrous Oxide,	11.16	14.60	11.35
Magnesia,	19.05	16.88	19.86
Cupric Oxide,	.....	.....	0.11
Niccolous Oxide,	.....	.....	0.25
	100.00	100.00	100.00

46. Gahnite.

Gahnite, or Automolite is mentioned by General Clingman as occurring in Cleveland county; also in Mitchell county.

47. Magnetite.

This is the most abundant and most valuable iron ore in North Carolina. It occurs in small octahedral crystals in the granite at Dunn's Mountain, in Rowan, and in the granites and gneisses and (especially) the syenites, very commonly, in many counties, and in the slates at Fisher's Peak and Chestnut Mountain, in Surry county, also at Bull's Head, in Alleghany county, in quartzose sand rock and hematite at Cooke's Gap, Watauga county, at Capp's Hill, in Mecklenburg county, and Fisher Hill, in Guilford. It occurs in its granular variety, mixed with muscovite, manganiferous garnet, etc, at Buckhorn, in Chatham county, and mixed with menaccanite and occasionally with corundum, in a succession of beds, passing through the gneissic rocks of Davidson, Guilford, Forsyth and Rockingham counties. There appear to be several isolated outcrops northwest of this band and between it and the Dan river, and also in Randolph and Montgomery counties. A band of granular magnetite, free from titanic acid, mixed with actinolite, tremolite and a little epidote, passes from near Danbury in Stokes county, and also from Surry county, through Yadkin, Forsyth, Davie, Lincoln and Gaston counties. It contains some of the most valuable ore beds. It is also found in large beds near Newton, in Catawba county; at Comb's farm, Summer's farm, and Thomas Payne's farm, in Iredell county; also in Orange, Mecklenburg and Cabarrus counties. Some very valuable ore beds of crystalline magnetite occur in Swain, Madison, Macon, Haywood, Burke, Alexander, Wilkes, Orange, Mitchell and other counties, the most extensive probably at Cranberry. A granular ore, similar to the ores of Surry county, has been worked at the north fork of New river, near the mouth of Helton creek, and on Horse creek, in Ashe county. There are many other localities in which magnetite occurs, but they are of less importance than those enumerated.

48. Chromite.

Occurs in the chrysolite beds, which form lenticular masses in the hornblende slates, &c., in minute octahedral crystals and granular masses at Culsagee; also at Higdon's, Ellijay's creek, and at Moore's Mine in Macon county, near Webster, and Hogback, and at Ainslie's, and on Scott's creek, in Jackson county, on Mining creek, near Hamp-

ton's, in Yancey county, at Cullakenee, in Clay county, Carter's Mine, in Madison county, in small quantities near Bakersville, Mitchell county, and on South Toe river, and on Rich Mountain, Watauga county, and lately by Hidden in the gold sands of Brindletown, Burke county, and in Ashe county. Where it is found in abundance, it may become a valuable ore, when it can be brought to market at a low freight. A small admixture of chromite is found in the titaniferous magnetite belt of Guilford, Rockingham and other counties. Crystals of chromite are frequently met with in the gold sands of Burke, McDowell, Rutherford, &c.

The analysis which I have made of a compact variety of chromite from near Franklin, Macon county, gave:

Spec. Grav., 4.319	
Chromic oxide,	41.15
Alumina,	22.41
Ferric oxide,	5.78
Ferrous oxide,	11.76
Magnesia,	15.67
	99.77

49 Uraninite.

It was found by Prof. Kerr, at the Flat Rock Mine, Mitchell county, in 1877, in small nodules of gummite and uranotil, forming the nucleus of these minerals, both of which are resulting from its decomposition. It has since been found at one or two other mines in Mitchell. Color iron black, graduating into brownish, according to the extent of its alteration. It has not been analyzed.

50. Rutile.

In beatiful crystals at Crowder's and Clubb's Mountains, Gaston county; also granular at the same localities, rarely in small grains or crystals with the corundum of the Culsagee Mine, in Macon county, and the Hogback Mine, in Jackson county; in acicular crystals, sometimes over one inch in length, near Beattie's Ford, Mecklenburg county; in long crystals in quartz on a hill near Buckhorn Falls, in Chatham county, and at the head of Cane creek, Mitchell county; in beautiful acicular crystals at Mrs. Daniel's farm near Mt. Pisgah, at

Mrs. Jordan's, near King's mill, at Alex. Lackley's, Misses Bennett's, Thomas Adams', and Mrs. Smith's farm, all in Iredell county. Acicular crystals in limonite and quartz on John Lackey's farm near Liberty church, and Wilson's near Poplar Springs, geniculated crystals at White Plains, also fine crystals at Milholland's mill, and at R. Johnston's, all in Alexander county. Acicular crystals in brownish amethyst, at the head of Honey creek, Wilkes county. In dark, almost black, crystals in Clay county. In quartz in Yancy county. In small grains and crystals in the gold sands of Burke, McDowell, Rutherford and Polk counties. Acicular crystals in quartz at Dietz's, Van Horn's, and Hildebrand's, and in large crystals also at the latter point, Burke county; in large crystals at E. Balch's, H. Balch's, widow Balch's, Huffman's, and D. Lutz's, and in amethyst at the last two points—all in Catawba county; in amethyst in Cabarrus near Concord; and in Randolph, near Pilot mountain; penetrating corundum near Bakersville, Mitchell county; at Ray's M., and elsewhere in Yancey county; in reticulated acicular cyrstals in the northwest corner of Lincoln county, (Hunter).

51. Anatase.

Anatase is reported as occurring in the gold sands of Burke county by Prof. Humphreys and Mr. Hidden, and by the latter also in Alexander (in quartz), McDowell and Rutherford.

52. Brookite.

In the gold sands of Rutherford, McDowell and Burke counties there seem to be two varieties of Brookite (if not distinct species), the one in small short or slender rhombic prisms, the other in monoclinic crystals of an almost black color, which, however, in their fragments, are transparent and between blue and colorless.

53. Pyrolusite.

It is found near Murphy, Cherokee county, also two miles north of Hickory, Catawba county, and with silver ores at the McMakin Mine, Cabarrus county, also in fine crystalline masses at Beck's ore bank, three miles from Ellison's ore bank, Gaston county, also near Dan-

bury, Stokes county, near Webster, Jackson county, in Surry county, near Dobson, and in Alexander, Swain and Mitchell. No large deposits have yet been discovered in North Carolina.

54. Braunite.

Found in quartz near Hillsboro, Orange county. K.

55. Hausmannite.

Recently reported from near Dobson, Surry county, by H. C. Lewis; and it also occurs in Chatham. K.

56. Disapore.

General Clingman observed this rare mineral associated with blue corundum from near Marshall, Madison county. I have not been able to distinguish it with certainty from any other of the corundum localities, but it was observed in very minute but beautiful acicular crystals of the usual form in a cavity of massive corundum from Culsagee, by John C. Trautwine, of Philadelphia.

57 & 58. Goethite and Limonite.

I put these two species of hydrated sesquioxide of iron together, as without fuller examination it is impossible to distinguish the majority of the specimens. Large beds of hydrated sesquioxide of iron are found at Ore Hill and elsewhere in Chatham county, and in Johnston, 5 miles W. and N. W. of Smithfield, near the High Shoals, in Gaston county, in Lincoln and Catawba counties, and near Murphy and along Valley River and Notteley, in Cherokee, and in Mitchell, Buncombe, Watauga, McDowell, Burke, Caldwell, Alexander, Wilkes, Surry, Haywood, Macon, Henderson, Transylvania, Davidson and Wake, and other counties: and superficial beds of it are also frequently found in the eastern counties—Nash, New Hanover, Pender, Jones, Duplin, &c. Brown hematites accompany in small quantities many of the magnetite and hematite beds, and form the upper part of many of the gold and copper mines; they are often the result of the alteration of siderite and pyrite, and show frequently the form of the original mineral, for instance, at Conrad Hill, in Davidson county, Cabarrus

county, Guilford county, Gaston county, and at Beam's farm, near Center Point, Iredell county.

59. Gummite.

Discovered by Prof. Kerr in 1877, at Flat Rock, Mitchell county. Often found in indistinct cubical crystals with octahedral planes, usually in amorphous compact nodular masses of a faint resinous lustre and of shades between reddish yellow and deep orange red. Fracture uneven to subconchoidal. Spec. gr. 4.840. The mean of three analyses which I have made gives it composition as follows:

Silicic Acid,	4.63
Alumina,	0.53
Baryta,	0.98
Strontia,	0.05
Lime,	2.05
Plumbic Oxide,	5.57
Uranic Oxide,	75.20
Phosphoric Acid,	0.12
Water,	10.54
	99.77

This analyses shows that the so-called gummite is *not* a distict mineral species but a mechanical mixture, the North Carolina variety being:

Uranic hydrate,	40.10	per cent.
Uranotil,	33.38	" "
Lead-Uranate,	22.66	" "
Barium-Uranate,	4.26	" "
	100.40	

Results from the alteration of Uraninite. Found also at the Deake and Lewis mines, Mitchell county. A similar mineral is found in small quantity at Buchanan mine, Mitchell county.

60. Psilomelane.

It is often an associate of gold and iron ores in coatings of the quartz at Scott's Hill, Burke county, together with pyrolusite at Beck's ore

bank, on the High Shoals, Gaston county, and in botryoidal masses in a vein, said to be four feet wide, near Lenoir, in Caldwell county, near Bakersville, and at Gillespies Gap in Mitchell county, on Cove Creek, and Richland Creek, Haywood county, and at Buckhorn in Chatham. In Gaston county at the Long Creek mine, on Cross Mountain, Ormond ore bank, etc., a variety occurs, which contains a small quantity of cobalt and nickel. Also found in McDowell and Lincoln counties.

61. Wad.

There is often an imperceptible change from pyrolusite into psilomelane and wad, that, without analysis, it is often difficult to know to which a specimen may belong. The earthy varieties are generally called wad. A brownish, black earthy wad occurs near Murphy, Cherokee county, also near Franklin, in Macon county, and Webster, in Jackson county, and at Gillespie Gap, Mitchell, and in Burke, Catawba, Surry and Mecklenburg.

62. Senarmontite or Valentintite.

The incrustation of the native antimony of Burke county, which does not show any crystalline planes, belongs to either one or the other of these species.

63. Bismite.

An earthy greenish yellow and straw yellow mineral has been observed at the King's Mountain mine, and the Asbury vein in Gaston county. It is probably Bismite.

64. Molyboite.

Found associated with molybdenite as a yellow earthy powder, near Pioneer Mills, Cabarrus county.

65. Quartz.

As a constituent of most of the rocks of North Carolina, and the gangue-rock of almost every vein, it occurs nearly everywhere throughout the State. Several of its varieties, however, are of more than

usual interest. *Rock crystal* is found in numerous most beautifully modified forms on the farms of Mrs. Lackey and others near Mahoffey's Mill, Alexander county. Good doubly terminated crystals occur at Sugar Mountain, Burke county; rock crystals are also found in Rutherford county, near Morganton, Burke county, near Hickory, Caldwell county, Catawba county, Iredell county, Mountain Mine, in Cleaveland county, at Hampton's, on Mining Creek, Yancey county, Stokesburg, in Stokes county, Macon county, Swain county, Rich Mountain, head of Cove Creek, in Watauga county, Mitchell, and Transylvania, in Wilkes, Guilford, Lincoln, Gaston, Burke, Anson, Granville, Wake, Moore, Warren, and other counties. *Quartz crystals, inclosing liquid*, (hydrolite, Humphreys,) in beautiful specimens, are found on Isaac Rice's farm, White Plains, Alexander county, also found by Prof. Humphreys, in pockets and drift veins in Catawba county, and in the South Mountains, Burke county, one with a bubble which moves nearly 2 inches, and a group of 13 crystals having 50 bubbles. He also found crystals with basal plane in Burke, Catawba, and Alexander counties. *Rutilated quartz* crystals of great beauty are met with at several localities in Randolph, Catawba, Burke, Iredell and Alexander counties, (enumerated under Rutile.) Quartz crystals with scaly crystals of hematite occur at King's Mill, Iredell county. Quartz between laminæ of muscovite, occurs at the Deake Mine, on Toe River, Mitchell county. *Radiated quartz* is found at Dillahay's Gold Mine, in Person county and in Wake county; *Amethyst*, in very fine crystals and clusters of crystals, and of a good violet or pink color, but mostly of a dark, smoky color, is found at Randleman's, Lincoln county, also at the lead mine, Alexander county, at Hickory, Catawba county, in Rutherford, Chatham and Wake counties; Amethyst of a deep purple color with rutile, occurs in Catawba county, and a smoky amethyst with rutile, at the head of Honey Creek, Wilkes county. *Rose quartz* is found at Highlands, Macon, near Franklinville, Randolph, (with acicular rutile,) White Plains, Alexander county, and near Concord, Cabarrus county, likewise penetrated with rutile. *Smoky quartz* is found three miles from Taylorsville, Alexander county, on Cavin's and also on Pritchard's and Patterson's farms; it also occurs in large crystals on Brush Cr., Mitchell county, and in the drift of Brindletown, Burke county, and at the mouth of Beaver Dam Creek, Cherokee county; *Milky quartz* is found at Roseman's farm, Alexander county, at the forks of the Laurel, Madison county, and at War Hill, Surry county; *Opalescent quartz* at Dan River, Stokes coun-

ty; *Quartz pseudomorphous* after calcite, both crystalized and fibrous, is found 2 to 3 miles N. W. of Rutherfordton, Rutherford county, the irregularly shaped fragments frequently contain water; similar pseudomorphs occur at Crawford's farm, 5 miles E. of Statesville, in Iredell county, a peculiar variety of pseudomorphous quartz, after feldspar perhaps, occurs at Shooting Creek, Clay county; *Chalcedony* is found near Franklin, Macon county, near Webster, Jackson county, at Hampton's Mining Creek, Yancey county, at Martin's limestone quarries, in Stokes county, on Alamance Cr., Alamance county, and in Lincoln, Iredell and Chatham counties. *Hornstone* occurs at Martin's Quarry, Stokes county, near Asheville, Buncombe county, in Madison county and Iredell county, and in Montgomery, Randolph and elsewhere. *Drusy quartz* is frequently found on the decomposed outcrops of the chrysolite beds in Macon, Jackson, Clay, Buncombe, and Madison counties. *Itacolumite* or flexible sandstone forms a stratum in the quartzite at Linville, Burke county, Sauratown Mountains, in Stokes county, and Bending Rock Mountain, in Wilkes county. *Fossil Wood* is abundant in the Triassic beds in Anson county, and near Germanton, in Stokes county, near Cheek's Creek, in Montgomery county, and in Johnston county, and in the quaternary gravels of Halifax, Moore, Cumberland, Wayne and other counties. *Agate* is found in many places, at D. Caldwell's, Mecklenburg county, near Harrisburg, and near Concord, Cabarrus county, in Granville, Orange and elsewhere. *Jasper* occurs, banded (red and black) in Person county, in Granville, (Knapp of Reeds Cr.,) in Madison county, (near Warm Springs, and on Shut In Cr.,) in Moore county, in Wake and elsewhere.

65. Opal.

The only variety of opal which has come to my notice from North Carolina is "hyalite" in bluish white mamillary coatings upon the quartz of gold veins in Cabarrus county, at the Culsagee Mine, Macon county. It is rarely found in beautiful, colorless and white botryoidal incrustations upon foliated chlorite.

2. *Ternary Oxygen Compounds.*

1. *Silicates. A. Anhydrous Silicates.*

67. Enstatite.

Forms beds at the corundum mine of Culsagee in Macon county, in coarsely crystalline masses of a brownish gray yellowish color; in coarsely granular masses with chrysolite, at Webster, Jackson county, also in small crystalline particles, disseminated through chrysolite, at Hampton's, Mining Creek, Yancey county, and two and a half miles south of Bakersville, in Mitchell county. *Bronzite* found at Bald Creek, Yancey county, and near Kernersville, Forsyth county. I had this mineral from the Culsagee mine analyzed in the Laboratory of the University of Pennsylvania by Frank Julian, who found

Water,	1.21
Silicic acid,	57.30
Alumina,	trace.
Ferrous oxide,	7.45
Magnesia,	34.64
	100.60

68. Pyroxene.

Black and brownish black, cleaveable masses, with magnetite, at Cranberry, Mitchell county, and of pale greenish color, with magnetite, on Ivy river, Madison county, and on Horse creek, Ashe county, and in "traps" at Greensboro, Guilford county; green coccolite, in calcite, two or three miles from the mouth of Bear Creek, and in marble, at Walnut creek, one mile from French Broad river, Madison county, and at Goshen, Macon county. Dark brownish black and black pyroxene is one of the constant constituents of the numerous "trap" rocks found in North Carolina.

69. Spodumene.

The mineral found at J. W. Warren's, Alexander county, and heretofore regarded as diopside, has been lately ascertained by Dr. J. L. Smith to be a new variety of *Spodumene*. He says: "It is one of the

most beautiful varieties of *spodumene* I have ever seen, and I think its beautiful color (emerald green) entitles it to a new name." His analysis is as follows:

Spec. Gr. 3.14.	
Silica,	64.5
Alumina,	27.0
Ox. Iron,	1.9
Lithia,	7.5

(The above facts have just been furnished by Hidden.) K.

70. Amphibole.

Amphibole is represented in North Carolina by numerous varieties. We find white and gray *tremolite*, associated with talc, at Marble creek and Murphy, Cherokee county, also on the Tennessee creek, Jackson county, in talc and chrysolite, at Webster, Jackson county, the Whiteside Mountains, Sugartown, eight and a half miles from Franklin, at the Culsagee mine, Macon county, two and a half miles south of Bakersville, in Mitchell county, and at Hampton's, Mining creek, Yancey county, on Toe river, at the Carter mine, Madison county, gap of Black Mountain, and the southeast slope of the Three-Top Mountain, in Ashe county; grey and brownish *grammatite* occurs near the Tennessee creek; *anthophyllite* occurs at Culsagee mine and at Gregory Hill in Macon county; *actinolite* has been observed in talc near Belt's Bridge, Iredell county, at Shooting creek, Clay county, Swannanoa river near Asheville, and with chrysolite at Webster, Jackson county, Hampton's, Mining creek, in Yancey county, two and a half miles south of Bakersville, Mitchell county, in talcose rocks, near Tennessee creek, on the east fork of Tuckasege one and a half miles from its mouth, Mecklenburg county, Rich Mountain, Watauga county, Franklin, in Macon county, at Bolejack's limestone quarry in Stokes county, at Rogers' ore bank near Danbury, in Stokes county, near Morganton, Burke county, and Ellison's, in Gaston county. *Asbestos* has been found at Webster, and at the head of Cullowhee creek, Jackson county, on Sugartown creek, near Franklin, at the Nantehaleh river in Macon county, the Brushy Mountains, at Baker mine, and on John's river and on King's creek, Caldwell county, and on Smith's river, Rockingham county, and in Franklin and Wilkes counties, at Hampton's, Mining creek, in Yancey county, at Buchanan's, and Cane creek near

Bakersville, in Mitchell county, also in quartz crystals at J. W. Warren's farm, White Plains, Alexander county. *Black* and *greenish black hornblende* is abundant throughout the State in the hornblende slates, hornblende rocks, syenite and diorite. It has been found in rather large cleavage pieces, twenty-three miles below Franklin, on the Swannanoa river near Asheville, at the Cullowhee and Savannah mines in Jackson county, at Jarrett's on the Nantehaleh in Cherokee county, at Polecat creek and near Greensboro, in Guilford county.

71. Smaragdite (?) Kokscharowite.

A beautiful mineral, which may be a variety of hornblende, occurs at the Cullakenee mine, Clay county. It has a bright color between emerald and grass green, gradually passing into grayish green and greenish gray. Sp. gr. of the grass-green variety, 3.120. It is associated with pink and ruby corundum and a feldspathic mineral. The analysis of the pure material gave Thos. M. Chatard:

Silicic acid,	45.14
Alumina,	17.59
Chromic oxide,	0.79
Ferrous oxide,	3.45
Niccolous oxide,	0.21
Magnesia,	16.69
Lime,	12.51
Soda,	2.25
Potash,	0.36
Ignition (water),	1.34
	100.33

72. Arfvedsonite.

A black-brownish or greenish-black hornblende, like mineral, is found associated with the andesite, zoisite and corundum of the Cullowhee mine, and Shooting creek, Clay county, and rarely at Culsagee, Macon county. It is easily fusible and gives a strong yellow flame, and is therefore probably arfvedsonite. An analysis of a black variety by J. L. Smith places it rather under the aluminous hornblende. He found

Silicic acid,	45.90
Alumina,	13.34
Ferric oxide,	11.46

Lime,	12.20
Magnesia,	12.53
Soda,	3.39
Water,	0.66
	99.48

73. Crocidolite (?)

I have received from Col. Joseph Willcox, which is said to come from one of the Western counties of North Carolina. The physical properties and the chemical tests, which I have made indicate that it is crocidolite. It consists of long delicate fibres of a blue color, is insoluble in acids and fuses easily to a black glass, coloring the flame yellow.

74. Beryl.

Found in six-sided prisms, sometimes doubly terminated, from about half an inch to four inches in thickness, and from one to six inches in length, color yellowish and bluish green, small pieces of the latter color, sometimes transparent enough to be cut for gems (aquamarine), associated with orthoclase, muscovite, tourmaline, etc., at Ray's Mine, on Hurricane Mountain, Yancey county. Yellowish green crystals have been found at Buchanan Mica Mine, and elsewhere in Mitchell county. Clear green crystals occur at Balsam Gap M., Buncombe county. Found also at the Carter M., Madison county, Thorn Mountain M., Macon, Casher's Valley, Jackson, on Green River, Henderson county, at E. Balch's, Catawba, Fort Defiance, Caldwell, at Well's, Gaston county. Some very large crystals were found (one 2 feet long and 7 inches in diameter,) 4 miles S. of Bakersville, and at Grassy Creek M. of still larger size. Green crystals appear at Point Pizzle M., and elsewhere in this county, and on Green River, Henderson county. The most beautiful varieties, similar to occurrences in Siberia, are found at G. W. Warren's farm, near Salem church, at White Plains, Alexander county. The deep green crystals resemble emerald; also in pale green or bluish green modified hexagonal prisms and pale bluish crystals. Beryl in yellowish green hexagonal prisms is also found at John Lackey's farm, near Liberty church, and Isaac Price's farm, White Plains, Alexander county. It also occurs in yellowish green crystals in Catawba county; one bluish green crystal,

implanted in quartz, has been found at Capt. Mills' Gold Mine, in Burke county, and another of an inch diameter and 4 inches length, with a tourmaline crystal of the same length, imbedded in it. In greenish yellow and deep green crystals, similar to Siberian, in the South Mountains, 9 miles S. E. of Morganton Burke county, and in the Sugar Mountains, also at Shoup's Ford, at Dietz's, Huffman's and Hildebrand's. In smaller crystals it is found in Jackson county.

72. Chrysolite.

This is one of the most interesting minerals of North Carolina where it forms large beds between the hornblende and granitic rocks. It is generally of a yellowish green color, but also greenish white, grey and brownish green, mostly finely granular, rarely foliated, occasionally in larger grains disseminated through the fine grained mass. Associated with chromite, enstatite, actinolite, tremolite, asbestos, talc, chromite, and corundum, at Culsagee Mine, near Franklin, Macon county, in Haywood county, near Webster, and Hogback, in Jackson county, at Bald Creek and at Hampton's, Jack's Creek, and South Toe river, seven miles from Burnsville, Yancey county, two and a half miles south of Bakersville, in Mitchell county, Shooting Creek, and Cullakenee Mine, Clay county, and at Rich Mountain, Watauga county, and at the Carter Mine in Madison county, on Ivy, Buncombe county, near the forks of New River, Ashe county, on Little River, Alleghany county, and 4 miles S. of Morganton, Burke county. It is also found with bronzite, in hornblende rock, in Guilford county, and near Raleigh, Wake county. I have analyzed two specimens from Jackson county, one, (1) which was finely granular and of a pale greenish color, and a spec. grav., 3.280, the other (2) of a yellowish olive green color and 3.252 spec. gravity, and Thos. M. Chatard one from the Culsagee Mine, (3).

	1	2	3
Loss by ignition,	0.82	0.76	1.72
Chromite,	0.58	1.83	——
Silicic Acid,	41.89	40.74	41.58
Alumina,	trace.	trace.	0.14
Ferrous Oxide,	7.39	7.26	7.49
Niccolous,	0.35	0.39	0.34
Magnesia,	49.13	49.18	49.28
Lime,	0.06	0.02	0.11
	100.22	100.18	100.66

The Chrysolite is subject to extensive alterations, forming serpentine and talc with their usual associates.

76. Garnet.

Widely distributed through the State, and a constant constituent of many of the mica and hornblende slates, in which it occurs in minute dodecahedral and trapezohedral crystals of a brownish or brownish red color; it also occurs in many of the talcose and chloritic slates; larger trapezohedral crystals of a brownish red color are frequently met with in the mica mines of Mitchell and Yancey counties; imperfect dodecahedral crystals at Weaver's, Jeanstown, Rutherford county, and in talcose slate, in Rockingham, Cherokee, Madison, Surry, and many other counties. The most beautiful and perfect crystals are large trapezohedra, of a brownish red color, from Burke, Caldwell and Catawba counties. A very excellent locality is about 8 miles S. E. of Morganton, in Burke county, where very bright red crystals are found, some weighing nearly 10 pounds. Another good location is 4 miles from Marshall, where large crystals are found embedded in chlorite slate. Some of these garnets are nearly transparent, and when cut, show a peculiar play of colors.

In Alexander county, on Marshall's farm, garnets are found which are two feet in diameter. Large crystals and crystalline masses of a reddish brown garnet, are found near Franklin, Macon county, and on Toe River, Mitchell county. *Pyrope*, of good color has been observed in the sands from gold washings in Burke, McDowell and Warren counties. The massive *manganese garnet* or spessartite, is abundant at Jeanstown, Rutherford county, at Buckhorn, Chatham county, near Moore's Mills, Stokes county, near Gold Hill, in Cabarrus county, near Brevard's Forge, one and a half miles from the Vesuvius Furnace, and near Macpelah Church, Lincoln county, near the High Shoals, and at Clubb's Mountain, and Crowder's Mountain, Gaston county, and near Madison, Rockingham county, near Salem, Forsyth county, on Horse Cr., Ashe county, Linville Mts., and Bridgewater, Burke county, in Guilford county, at Thorn Mt. M., Macon county, near Marion, McDowell county, at Buchanan M., Mitchell county, on Pacolet R., Polk county, at Weaver's, Rutherford county, and near Dobson, Surry county.

Dr. G. A. Koenig has analyzed a variety of manganese garnet or spessartite from Yancey county (1), and I that from near Salem, Forsythe county (2), which contain

Spec. Grav. 4.14.	1.	2.
Silicic acid,	35.80	36.74
Alumina,	19.06	16.55
Ferric oxide,	6.25	not determined.
Manganous oxide,	28.64	25 80
Ferrous oxide,	4.49	14.26
Magnesia,	0.60	2.56
Lime,	.....	4.09
	99.84	100.00

77. Zircon.

Abundant with the gold sands of Burke, McDowell, Polk, Rutherford, Caldwell, Mecklenburg, Nash, Warren, and other counties, in very minute yellowish brown and brownish white, sometimes amethystine, pink and blue crystals with many planes; large greyish brown crystals of zircons are found so abundant on the south side of the Blue Ridge near Green river, Henderson county, that General Clingman easily obtained, in a few weeks, in 1869, one thousand pounds of crystals. They are found here embedded in felspathic gneiss, and also in a similar association near Coleman's Station. Found also by Dr. Hunter at Well's farm, Gaston county. It is rarely found at Ray's mine, Hurricane Mountain, Yancey county, and the Flat Rock mine, Mitchell county. It has been observed in dark red brown crystals in the magnetite beds of the Unaka Mountains; an irregular large crystal of about two inches in length and a pale brownish grey color has been found by J. A. D. Stephenson near Statesville, Iredell county, and by the same, small crystals embedded in allanite, near Bethany church.

78. Vesuvianite.

A mineral, resembling vesuvianite, occurs in brownish green indistinct crystaline masses, intermixed with quartz, and associated with reddish brown garnet, in Macon county.

79. Epidote.

Epidote is found abundantly in North Carolina, although fine crystals are exceedingly rare. The finest specimen, which I have seen, is a crystal, in the cabinet of the University of Pennsylvania, from the gold washings of Rutherford county; it is strongly pleochroic, like

the so-called "Puschkinite," from the auriferous sands of Katharinenburg, in the Ural Mountains. Fine crystals have been lately obtained by Hidden, at Hampton's, Yancey county. Yellowish and brownish green crystalline masses, sometimes with indistinct crystals, have been found near White's mill, Gaston county, and near Franklin, in Macon county. At the latter place occurs also a variety in short, stout crystals of a dark brown or greenish brown color, (analysis below). In Mitchell county it is found in dark browish green crystals and radiating masses. Crystals and crystalline masses in quartz at White Plains, Alexander county. Fragments of epidote in greenish crystals, also a granular variety are frequently met with in the gold sands of Burke, McDowell and Rutherford counties.

Epidote of olive green or greyish and browish green color occurs massive as a frequent admixture of hornblende slate, (notably in Mitchell county,) or diorite, sometimes forming pure masses of epidosite, as at the foot of Grandfather Mountain, head of Watauga river, Watauga county. It occurs also abundantly and conspicuously, as bright green amygdules in the chloritic amygdaloidal gneisses on Watauga river. It constitutes, with a reddish feldspar, the so-called unakyte rock, which may be seen at Marshall, Madison county, and down the French Broad in occasional seams, and thin beds for several miles. It has also been found in many of the magnetic iron ore beds, as at Cranberry, Mitchell county, at Smith's ore bed on Ivy, Madison county, in the beds on Horse creek, Ashe county, at Buckhorn, Chatham county, &c.

I have analyzed the brown epidote from Macon county, and found the Spec. Grav. 3.269, and its composition:

Silicic acid	36.95
Alumina,	25.82
Ferric oxide,	9.97
Ferrous oxide,	1.34
Manganous oxide,	0.56
Magnesia,	0.56
Lime,	21.86
Ignition (water),	3.02.
	100.08

80. Allanite.

Allanite is found in jet black or browish black slender crystals,

sometimes of six and twelve inches in length, and crystalline masses in a granite vein at Balsam Gap, Buncombe county, and under similar circumstances at the Buchanan mine, Mitchell county. I have analyzed that from the Balsam Gap. Spec. Grav. 3.400. It contains

Silicic acid,	32.79
Alumina,	18.16
Ferric oxide,	1.64
Ferrous oxide,	10.08
Manganous oxide,	1.23
Cerous oxide,	6.07
Didymous and Lanthanous oxides,	14.40
Yttria,	1.84
Magnesia,	0.15
Lime,	10.95
Soda,	0.33
Potash,	0.12
Ignition (water),	1.89
	99.75

At both localities the allanite undergoes an alteration and changes into a pale brownish or brownish yellow mineral which has not been further examined. A mineral of an orange color from the Buchanan mine, resembling *gummite* may be the so-called *yttro-gummite;* the quantity at hand was too small and impure for analysis, but it contains uranic oxide and some of the rare earth of the cerium or yttrium groups. This mineral has been recently found in massive form, like the Amherst county (Va.,) mineral, by J. A. D. Stevenson, near Bethany church, Iredell county, with small crystals of zirkon embedded.

81. Zoisite.

The beautiful variety of zoisite, "thulite," has been found in slender rose-red crystals in the feldspars at the Flat Rock mine, Mitchell county. At the Cullakenee mine it is found as one of the products of the alteration of corundum. Some of the pink as well as the bluish grey corundum are changed into compact and cleavable columnar masses of zoisite of a greyish, greenish and brownish white color. G. A. Koenig has analyzed the slightly greenish white cleavable variety, (1), which has resulted from the alteration of pink corundum. I have made an analysis of the white, slightly greyish zoisite, (2), containing still nuclei of unaltered bluish grey corundum:

	1.	2.
Sp. Gr.,	3.286	3.224
Silicic acid,	40.70	39.86
Alumina,	33 86	33.84
Ferric oxide,	0.81	1.62
Manganous oxide,	trace.	trace.
Magnesia,	0.22	0.18
Lime,	24.05	23.82
Soda, (trace of lithia),	not det'd	0.22
Potash,	" "	0.09
Loss by ignition,	0.63	0.78
	100.27	100.41

About half a mile southwest of Silver Hill, about thirty years ago, a greyish white foilated and columnar mineral was found, when searching for the continuation of the vein, which had the appearance of zoisite. No further examination was made, and there is now probably no specimen preserved. Dr. Hunter reports it from Alleghany county.

82. Phlogopite.

Small brownish scales of it have been found in the granular limestone of Bolejack's quarry, near Germanton, and at Martin's quarry on Snow creek, Stokes county, on Walnut creek, one mile from the French Broad river, in Madison county, on Valley river, in Cherokee county, and at Judge Pearson's, near the Yadkin river, Yadkin county. It is found also near Coleman's Station, in Henderson county.

83. Biotite.

Biotite is a constituent of many of the granites, gneisses and micaschists of North Carolina. It is found only in small black or brownish black plates or scales. The localities are too numerous for mentioning any particular one. It occurs in large plates and in very regular crystals in the mica mines of Mitchell, Haywood, Yancey and especially Macon, notably at Lytle & Thorn Mountain mines.

84. Muscovite.

The mica of the gneiss and micaschist is mostly muscovite, hence

it is one of the commonest minerals of North Carolina. In a few localities it is found in beautiful crystals, for instance, with magnetite, at Buckhorn, in Chatham county, with quartz, at Hickory, Catawba county, and with pyrite, in Stokes county. Since the year 1868, it has been mined in many places and has been obtained in large plates, at times over three feet in diameter, generally of a brownish color, in masses or large crystals, associated with grey, smoky, or yellowish brown quartz, orthoclase, albite, etc., in numerous localities in Macon, Jackson, Haywood, Buncombe, Ashe, McDowell, Mitchell, Yancey, Alexander, Cleveland and other counties. A pink colored muscovite in fine scales, much resembling lepidolite, for which it was mistaken, occurs with mica at Ray's, in Yancey county, and at the Flat Rock Mine, in Mitchell county.

85. Labradorite.

A white, and in some portions colorless, very lustrous cleavable variety with very few triclinic striæ, occurs at the Cullakenee mine, in Clay county. It has a spec. grav. of 2.62. I had it analyzed in the Labratory of the University of Pennsylvania by Mr. W. H. Jarden, who found

Silicic acid,	55.61
Alumina,	26.90
Lime,	9.60
Soda,	6.97
Potash,	0.55
Ignition (water),	0.35
	99.98

It has been found in gray granular cleavable masses, but only at a few localities.

Near the road, six miles north of Burnsville, in Yancey county, it is associated with mica, garnet, etc., as one of the constituents of a stratified rock; it occurs in a trap near the Tuckasegee ford, half a mile from the Catawba river, on the road to Charlotte, in Mecklenburg county, also at Shiloh church in Granville county, in large crystals in the heavy trap on Toe River below Bakersville, Mitchell county. The latter locality furnishes specimens which show slightly the play of blueish colors. It is one of the constituents of the crypto-crystalline trap-rock found throughout the State.

86. Andesite.

In snow white and bluish white cleavable masses, showing fine striæ upon the cleavage planes, associated with black hornblende or arfvedsonite at the Cullakenee mine, Clay county; and from the same locality as very fine grained white feldspar associated with zoisite and margarite, and like the latter, resulting from the alteration of corundum. Both have been analyzed—the first by G. A. Koenig (1), the latter by Th. M. Chatard (2):

	1	2
Spec. Grav.,	2.611	2.610
Silicic acid	57.29	58.41
Alumina,	26.52	25.93
Ferric oxide,	0.21	0.38
Magnesia,	0.15	0.18
Lime,	7.80	5.82
Soda,	6.75	6.45
Potash,	0.33	2.10
Loss by ignition,	1.43	0.93
	100.48	100.20

There are similar white feldspars at the Hogback mine in Jackson county, Culsagee mine in Macon county, and the Carter mine in Madison county, which may belong here. No others have been analyzed.

87. Oligoclase.

A fine grained greyish white feldspar, through which minute particles of black tourmaline are disseminated, occurs in considerable quantities at Culsagee, Macon county. It has been analyzed by J. L. Smith (1), and also in the Laboratory of the University of Pennsylvania by Frank Julian (2), who found:

	1	2
Silicic acid,	64.12	72.60
Alumina,	24.20	13.04
Ferric oxide,	0.14	1.76
Magnesia,	.....	0.39
Lime,	2.80	2.54

Soda,	9.28	6.23
Potash,	.....	2.39
Loss by ignition (water),	.....	0.34
	100.54	99.29

The material for the second analysis had evidently a considerable admixture of quartz.

88. Albite.

It is found in large cleavable masses of a white color, at Point Pizzle, Mitchell county, showing upon the cleavage planes more or less distinct striation. I had it analyzed in the Laboratory of the University of Pennsylvania by Frank Julian (1), (see below). Spec. grav., 2.638. There are probably many of the white and greyish or brownish white striated feldspars from mica mines, such as from the Gibbs mine, South Toe river, Yancey county, the Flat Rock mine and the Buchanan mine in Mitchell county, Ainslie's in Jackson county, and Thorn Mountain mine in Macon, and many others, which belong to this species or to oligoclase, which can only be distinguished by analysis. An interesting occurrence is that at the Presly mine, Haywood county, where it, together with damourite, results from the alteration of corundum. Small white granular cleavable, also compact masses have been found at the Steele mine, Montgomery county, associated with prochlorite, gold, pyrite, sphalerite, &c.

Some of the granitic rocks 3 miles west of Leasburg, Caswell county, contain small grains of a tricilinic feldspar, which may be albite.

The compact greyish white variety from the Steele mine has been analyzed by Geo. J. Popplein (2):

	1	2
Silicic acid,	67.51	60.29
Alumina,	20.46	19.66
Ferric oxide,	trace.	4.63
Manganous oxide,	.....	trace.
Magnesia,	0.34	0.23
Lime,	3.08	1.83
Soda,	9.15	9.90
Potash,	trace.	1.71
Loss by ignition,	.....	1.20
	100.54	99.45

89. Orthoclase.

This is one of the most widely distributed minerals in the State, forming an essential constituent of all the granite, gneiss, etc. It is found in beautiful crystals in a band of porphyritic granite, near Salisbury, Rowan county, the High Shoals and White's Mill, in Gaston county, and on Hitchcock's creek, and elsewhere in Richmond county, also in the "Chesterlite" form at Silver Hill, associated with pyromorphite and quartz. Cleavable masses of orthoclase are found at Houp's farm near Statesville, and near Belt's Bridge, Iredell county. A peculiar variety, with satin lustre upon the cleavage planes, occurs in Clay county, near Cullakenee. Large lamellar masses of a white, greyish or reddish color, occur at Ray's mine, Yancey county, at Flat Rock, Blalock's, and near Bakersville, in Mitchell county, also in Caldwell county, at Hampton's, Mining Creek, near Burnsville, Yancey county, on Sugartown Turnpike, ten miles from Franklin, and at the Whiteside mountain, in Macon county, and on French Broad river, in Madison county, and in the Mica mines everywhere. The Burnet Mica mine, Buncombe county, furnished the Museum with a crystal weighing 800 pounds. The peculiar compact variety of orthoclase which is spotted with hydrated sesquioxide of manganese, the so-called "leopardite," is found near Charlotte, Mecklenburg county, and also in Gaston county. It is a variety of porphyry with crystals of quartz disseminated. I have made an analysis of the feldspathic constituent, which has a yellowish white color and a cryptocrystalline structure (1). Miss Mary T. Lewis has analyzed in the Laboratory of the University of Pennsylvania, the orthoclase from Houp's farm, Iredell county (2).

	1	2
Silicic acid,	75 92	64.56
Alumina,	14.47	20.60
Ferric oxide,	0.88	
Magnesia,	0.09	.....
Lime,	0.02	0.36
Soda,	4.98	trace.
Potash,	4.01	14.85
	100.01	100.37

90. Tourmaline.

The tourmalines, found in many localities in North Carolina, are mostly the black varieties. A small, well terminated transparent green crystal was found by Col. Mills on Silver Creek, Burke county, also a black crystal 4 inches long embedded in a green beryl crystal. Crystals of from 1 to 2 inches in size, have been found near Mountain mine, Cleveland county, on Upper Little river, Caldwell county, at Hanging Dog creek, in Cherokee, and in Rutherford, Mecklenburg, Yancey, Mitchell, Macon, Haywood, Transylvania, Polk, Buncombe, Caldwell, Stokes, Johnston, Wake, Granville, and other counties. In beautiful well terminated crystals of 2 to 3 inches in length it is found in the South mountains 16 miles S. E. of Morganton, in Burke county, also near King's mill, Iredell county, and at Warren's, near Salem church, John Lackey's and Isaac Price's, on the White Plains, Alexander county. In slender black crystals, often radiating, and of needle-like shape, frequently flattened between the plates of muscovite, it is found at Ray's mine, near Burnsville, where also a greenish and yellowish green, fibrous and finely columnar variety occurs. It is frequently and in large masses associated with the corundum of Culsagee mine, in Macon county. At the Cullakenee mine, Clay county, it is found in small quantity, also at the Hogback mine, Jackson county, and with the corundum and damourite at Belt's Bridge, in Iredell county. A large outcrop of fibrous and granular tourmaline, with quartz, is found about two hundred yards northeast of the Ellison mine, on the High Shoals property, in Gaston county, and a peculiar finely striated variety, with quartz, at Clubb's Mountain; similar finely fibrous wood-like masses occur at Leasburg, Caswell county, and in Wake. It has also been observed in the gold sands from Burke county. Tourmaline rock and slate has been noticed at Kernersville, Guilford county, at Bee Rock, head of Turkey creek, in McDowell county, and at Jeanstown, Rutherford county, and six miles south of Asheville, on the Hendersonville road, and in Cleveland county.

91. Fibrolite.

A reddish white finely fibrous mineral, with silky lustre, from Macon county, probably belongs to this species.

A very interesting occurrence of fibrolite has lately been discovered

near Shoup's ford, in Burke county, where it is the result of the alteration of corundum and envelopes a core of the original mineral. The fibrolite may, in part, have been changed into damourite, as it occurs in the mica schist (damourite schist) of the neighborhood in small needle-shaped crystals. A mineral resembling fibrolite is found in quartz in the gold gravel of Burke and McDowell counties.

92. Cyanite.

This is one of the characteristic accessories in many of the mica and hornblende schists of Macon, Haywood, Transylvania, Yancey, Mitchell, Caldwell, Catawba, Gaston and other counties, and is generally of a greyish white or grey color, and in imperfect crystals. Fine crystals occur at Clubb's and Crowder's mountains, Gaston county; coarsely bladed masses of a blue and greenish color at Swannoa Gap, Buncombe county, also near Ray's Mica mine, on Hurricane mountain, and elsewhere in Yancey county, Mitchell, Cherokee, and Wilkes counties; six miles east of Danbury, in Stokes county, near Davidson College, in Mecklenburg county. In blue and white bladed crystals in quartz at Hoover's farm, 6 miles S. W. of Statesville, also in gravel, near Statesville, Iredell county. A greyish white, radiating cyanite is found at Ararat river, four miles southeast of Mount Airy, in Surry county, and a white cyanite at the foot of Barnett's mountain, in Person county. Cyanite also occurs on Valley River, in Cherokee, at Tipton's, in Clay county, in quartz at the head of Jonathan's Cr., in Haywood county, on Bear Cr., in Madison county, at the Buchanan mine, Mitchell county, in the N. W. corner of Wake county, and in Moore and elsewhere.

The white cyanite, associated with the lazulite of Clubb's mountain has been analyzed by Smith and Brush, who found

Silicic acid,	37.60
Alumina,	60.40
Ferric oxide,	1.60
	99.60

93. Topaz.

Topaz is reported as occurring at Crowder's mountain, but it is very doubtful; crystals from there, which were considered topaz, are cyanite. The variety, *pycnite*, occurs in finely columnar aggregations of

a yellowish and brownish yellow color, associated with garnets, near White's Mill, Gaston county.

94. Euclase.

General Clingman mentions a very handsome crystal of this rare mineral from the gold mine of the late Morril Mills, in the eastern part of Polk county.

95. Titanite.

General Clingman mentions titanite, or sphene, as occurring in Buncombe county. I have observed it at Morganton Springs, Burke county, in minute brown crystals, in hornblende slate and in granite at White's Mills, in Gaston county, and at Rogers' Ore Bank, near Danbury, in Stokes county, and on Hurricane mountain, Yancey county. To this species probably belong two of Prof. Shepard's very doubtful species, the *Xanthitane*, from Greene river, in Henderson county, and the *Pyromelane*, from the gold washings of McDowell county. Hidden reports it also in Alexander county.

96. Staurolite.

Very large, brownish red crystals, from two and a half to three inches in length, and one to one and a half inches wide, single individuals as well as twins, occur at the Parker mine, in Cherokee county. There are many other localities in Cherokee and Macon counties, where it occurs abundantly in argillaceous and talcose slates, as on Persimmon Cr., and Hanging Dog Cr., on Bear Cr., Madison county, and Tusquittah Cr., in Clay county. It is found in very small quantity with corundum and chlorite in small reddish brown grains of vitreous lustre, but without distinct form, at the Culsagee mine, Macon county. They have a Spec. Gr. of 3.711. An analysis which I have made gave

Silicic acid,	27.91
Alumina,	52 92
Ferric oxide,	6.87
Ferrous oxide,	7.80
Magnesia,	3.28
Lime and Manganous oxide,	traces.
Ignition (water,)	1.59
	100.37

B. Hydrous Silicates.

97. Chrysocolla.

Inferior specimens, generally much mixed with other copper ores, have been observed at many of the copper mines; for instance, at the Gardner Hill and Cambridge mines in Guilford county, the Pioneer Mills in Cabarrus county, the Gillis mine and at Mill creek in Person county, Northington's dam in Harnett county, Wolf Creek mine in Jackson county, at Welch's in Moore county, at Grupy mine and elsewhere in Rowan county, near Elkin in Surry county, the Hopewell in Mecklenburg county, at the Clegg mine and at Snipes' iron mine in Chatham county, Gap Creek mine in Ashe county, and in many other places.

98. Calamine.

The only specimen of calamine, which I have observed, came from Silver Hill, Davidson county, where it occurs sparingly as an incrustation of fibrous and radiating structure upon argentiferous galenite.

99. Talc.

Resulting from the alteration of chrysolite, foliated talc, of a white or greenish white color, is found in many of the chrysolite beds, west of the Blue Ridge; at Shooting Creek, Clay county, Culsagee, Macon county, Webster, Jackson county, Hampton's, Mining Creek, and at Young's, on South Toe river, Yancey county, near Bakersville, Mitchell county, and other localities; in sheets of three-quarters to one inch in thickness and of a somewhat columnar structure, near Pilot mountain, and near Dobson, Surry county; fibrous talc with silky lustre, and of a white or green color, also compact crystalline white talc, with a splintery structure on Valley river, Cherokee county, and also in Macon county. Talc slate and coarse soapstone is found in many localities throughout the State; it has been noted in some thirty counties; for instance, near Belt's Bridge, Iredell county, in the South mountains of Burke county, in Caldwell, in Haywood county near Waynesville, in the north of Wake county, &c, I have analyzed a specimen from Webster, Jackson county, and found it to contain:

Water,	0.34
Silicic acid,	64.44
Alumina,	0.48
Ferrous oxide,	1.39
Niccolous oxide,	0.23
Magnesia,	33.19
	100.07

100. Pyrophyllite.

In white, yellowish, greenish and brownish white, stellate aggregations, fibrous and radiated masses at Cotton Stone Mountain, Montgomery county, Pilot Knob, Randolph county, Davidson College, Mecklenburg county, Hillsboro, Orange county, Crowder's and Clubb's mountains in Gaston county, and on Linville mountain, McDowell county. The slaty variety forms large beds of yellowish white or greenish color in Chatham, Moore and Orange counties.

A schistose imperfectly lamellar variety from the Deep river has been analyzed by Sam'l T. Tyson (1), and a similar one, of a somewhat whiter color, from Carbonton, by O. D. Allen (2):

	1	2
Spec. Grav.,	2.92	2 82
Silicic acid,	65 93	66.25
Alumina,	29.54	27 91
Ferrous oxide,		1.08
Water,	5.40	5.25
	100.87	100.49

101. Stilpnomelane(?)

A mineral, similar to stilpnomelane, has been found in compact greenish black masses at the Cosby Mine, Cabarrus county.

102. Glauconite.

The green grains forming one of the constituents of many of the so-called marl beds in the eastern part of the State, are glauconite. Occurs in most of the counties of that section south of Tar river.

103. Serpentine.

The massive varieties are found in many localities. The best appears to come from the neighborhood of Patterson, Caldwell county. It has a dark, greenish black color, and contains fine veins of the yellowish green fibrous and silky *chrysotile*, and admits of a fine polish ; greenish grey massive serpentine, also with seams of greenish and grayish white chrysotile is found at the Baker mine in Caldwell county, at which place is also found the varieties *marmolite* and *picrolite;* this last also occurs abundantly in the Buck Creek corundum mine, Clay county. Dark green serpentine has been observed in the neighborhood of Asheville in Buncombe county, in Forsythe and Wake counties. A greyish or yellowish green serpentine occurs in Caldwell, Wilkes, Surry, Yancey, Stokes, Orange and Wake counties, in the chrysolite beds of Macon, Jackson, Yancey, Mitchell, Watauga, Burke, and other counties; it results from the decomposition of the chrysolite, which however is not always complete and gives rise to intermediate stages, in which we have to deal with mixtures of both species. Such a mixture from the Cullakenee mine, Clay county, has been analyzed by me (1), also a compact massive serpentine resembling the variety williamsite from the chrysolite beds of Webster (2):

	1	2
Silicic acid,	35.19	43.87
Alumina,	0.64	0.31
Ferrous oxide,	9.70	7.17
Niccolous oxide,	.....	0.27
Manganous oxide	.....	trace
Magnesia,	40.99	38.62
Lime,	.....	0.02
Chromite,	.....	0.57
Water,	13.48	9 55
	100.00	100.38

104. Deweylite.

This mineral is found in all the chrysolite beds of the Western counties, in yellowish and greenish masses, in their veins or seams, through the decomposed rocks.

105. Cerolite.

In small veins or seams in decomposed chrysolite at Culsagee mine, Macon county, forming white or yellowish masses. It has not been analyzed.

106. Genthite.

In amorphous apple-green coatings upon decomposing chrysolite, at Webster, Jackson county, and sparingly at the Culsagee mine, Macon county, and also on Ivy river, Buncombe county.

107. Kaolinite.

Snow white kaolin is found as the result of the decomposition of orthoclase at most of the mica mines in Mitchell, Yancey, Macon and other counties. Good qualities are found six or seven miles from Newton, Catawba county, also in Lincoln, Burke, and many other counties. *Clay* for firebricks and earthenware occurs in many localities throughout the State.

108. Saponite.

Found in Mitchell county, near Bakersville, in the cavities of the cellular hornstone of the chrysolite; popularly known as *mountain tallow.* K.

109. Halloysite.

Found near Salem, Forsyth county; is of an olive green color, and waxy lustre. The variety lithomarge occurs in Burke county. K.

110. Pinite.

This mineral is found as a light grey to pale or dull greenish coating in the joints and seams and between the laminæ of the conglomeritic and felsitic slates of the Huronian series in the middle counties, and also of the granulites of the Blue Ridge. K.

111. Margarodite.

Occurs in several of the mica mines of Mitchell, Yancey, Macon, &c., and also occurs in Wake county in association with tourmaline. K.

112. Paragonite.

Is found in the so-called talcoid and talco-micaceous schists of the Piedmont section, especially in Burke, Caldwell and Catawba, it enters as a common constituent of the soft brown and purple schists so common as to be characteristic of the region. It is also to be seen at Round Knob, in McDowell, in the altered schists and slates exposed in the railroad cuts, and in similar rocks in Wake county, near Raleigh; and in many other localities. K.

113. Damourite.

Very fine white and yellowish white pearly scales are found with the cyanite at Crowder's and Clubb's mountains, which are damourite, and result from alteration of the cyanite. Under similar circumstances it is found in Yancey, Cherokee and Iredell counties. A slaty damourite, much resembling the pyrophlite slates of Chatham and Moore counties, occurs near Warm Springs, Madison county. The most interesting occurrence of damourite is that resulting from the alteration of corundum. In this connection it is found in many varieties. It is sometimes in compact masses, with a crystalline structure, and a yellowish white color surrounding the corundum as at the Haskett mine, Macon county, or it envelopes the nodules of corundum, as at Belt's bridge, Iredell county, and has a very fine fibrous structure with delicate silky lustre—the fine particles gradually assuming a scaly structure and large size. At Crowder's and Clubb's mountains and the Culsagee mine, Macon county, the damourite, surrounding corundum, occurs in the form of small silver white scales, usually discolored by a thin coating of oxide of iron. At the Hogback mine, in Jackson, and especially in Haywood county, it occurs in a similar manner but it frequently surrounds large masses of corundum with a compact or semi-fibrous coating with silky lustre, which towards the margin becomes more crystalline and scaly; at

the Presley mine, Haywood county, it is found in very fine scales, gradually increasing to plates of an inch in diameter, and sometimes directly into large hexagonal crystals of three to four inches in diameter, still inclosing nuclei of the original mineral.

The importance of this occurrence required numerous analyses to support my view on this subject.

The following have been analyzed in the Laboratory of the University of Pennsyvania:

1. The finely fibrous from Belt's Bridge, by Miss Mary T. Lewis.
2. The fine scales from Crowder's mountain, by Thos. M. Chatard.
3. The fine scales from Culsagee, by Geo. A. Koenig.
4. Plates of about one inch in diameter from the Presley mine, by myself.

The following are the results:

	1	2	3	4
Spec. Grav.,	.....	2.860	2.867	.....
Silicic acid,	45.96	43.51	45.62	44.89
Alumina,	38.22	37.85	35.93	38.02
Ferric oxide,	0.61		2.93	1.96
Magnesia,	.....	0.31	0.34	0.14
Lime,	0.37	0 42	trace.	0.30
Lithia,	.....	trace.	trace.	.....
Soda,	0.74	1.04	0.71	0.60
Potash,	9.21	11.35	9.40	10.26
Water,	4.89	7.73	4.93	4.50
	100.00	102.21	99.86	100.67

The soft pseudomorphous crystals in the form of staurolite from Cherokee county, are probably damourite in composition.

114. Culsageeite.

The mineral, which I had described as Jefferisite from Culsagee, has been distinguished by Prof. Josiah P. Cooke, Jr., as *culsageeite*. It occurs in broad laminæ or plated masses of a yellowish brown color, sometimes 4 and 5 inches in diameter, which, when heated exfoliate in a remarkable manner. It is also found at the same locality, in greenish, brownish, yellow scales, not over one-eighth of an inch in diameter. Both varieties have been analyzed, the former by Geo. A. Koenig, (1), the latter by Thos. A. Chatard, (2). J. P. Cooke, Jr., has

also analyzed the large plates, but his analyses represent the mineral after having been dried at 100°C, (212°F.) by which operation it lost from 10.19 to 10.27 per cent of water.

	1	2	3 (dried.)
Spec. Gr.,	.....	.....	2.225
Silicic acid,	33.93	34.00	37.58
Alumina,	17.38	20.36	19.73
Ferric oxide,	5.42	4.91	5.95
Ferrous oxide,	0.50	0.42	0.58
Niccolous oxide,	0.35	0.57	.....
Magnesia,	23.43	21.71	25.13
Water,	19.17	18.50	11.09
	100.18	100.47	100.06

It likewise occurs on Ivy river near Carter's, Buncombe county, and at Carter's mine, Madison county, and in Henderson county at Coleman's Station.

115. Kerrite.

Consists of innumerable fine scales of pale greenish yellow color and pearly lustre. Exfoliate when heated, but less so than culsageeite. From the Culsagee mine.

It was analyzed by Thos. M. Chatard, who found as the mean result of two analyses:

Spec. Gr.,	2.303
Silicic acid,	38.29
Alumina,	11.41
Ferric oxide,	1.95
Ferrous oxide,	0.32
Niccolous oxide,	0.25
Magnesia,	26.40
Water,	21.25
	99.87

116. Maconite.

Closely resembles fine scaly culsageeite. Dark brown, with pearly lustre, inclinining to submetallic. Largely exfoliating, when heated. Numerous fragments of bluish grey corundum are imbedded in it.

The carefully selected pure scales were analyzed by Thos. M. Chatard, who found as the mean result of two analyses:

Spec. Grav.	2.827
Silicic acid,	34.22
Alumina,	21.53
Ferric oxide,	12.41
Ferrous oxide,	0.32
Niccolous oxide,	0.12
Magnesia,	14.46
Lithia,	trace.
Soda,	0.51
Potash,	5.70
Water,	11.85
	101.12

117. Penninite.

The variety kæmmererite, in violet and peach-blossom red scales, is associated with chromite at Culsagee in Macon county, Webster in Jackson county, Hampton's, Mining Creek, Yancey county, Rich Mountain, Watauga county, etc.; three-sided and six-sided plated crystals of a dark, greenish and purplish color, associated with talc, etc., in the chrysolite beds at the same localities; also at Bakersville, Mitchell county, and Scott's Creek, Jackson county.

118. Prochlorite (and Chlorite.)

Fine-grained scaly prochlorite, of a dark green color, rarely in wormlike aggregations, is found associated with an albitic rock, from an alteration of which it has resulted, at the Steele mine, Montgomery county. At the Culsagee mine prochlorite occurs as the result of the alteration of corundum, often showing the form and containing yet a core of the original mineral. Frequently the corundum has first changed into spinel and the latter has subsequently been altered into prochlorite, but in either case, where it touches the original mineral, it is frequently of a fine scaly pseudo-fibrous structure and becoming more laminated at a greater distance. But this is not always the case, as very often broadly foliated prochlorite is in immediate contact with corundum. Both the laminated and fine scaly form beds of considerable size. Under similar circumstances it is found at the Hogback

mine in Jackson county, at Shooting Creek in Clay county; near Marshall and at the Carter mine in Madison county.

(The so-called corundophilite of Shepard, which was established by him on the prochlorite of Marshall, has *no* existence in North Carolina.) Chlorite in scales and scaly aggregations is found in many of the gold and copper mines in the state, and chloritic slate at many localities throughout the whole slate belt, and in many counties outside of it, both in the Huronian and Montalban rocks.

I have analyzed the broadly foliated dark green variety (1), and the fine scaly variety diverging from corundum (2), both from Culsagee; and the fine scaly prochlorite from the Steele mine (3):

	1	2	3
Silicic acid,	27.56	29.48	24.90
Alumina,	22.75	22.22	21.77
Ferric oxide,	2.56	0.70	4.60
Ferrous oxide,	5.43	5.30	24.21
Niccolous oxide.	0.30	0.11	.....
Manganous oxide.		0.17	1.15
Magnesia,	28.47	30 99	12.78
Water,	13.80	11.63	10.59
	100.87	100 60	100.00

Analyses of other specimens from Culsagee, made by Thos. M. Chatard and J. L. Smith, gave similar results. It will be seen from these analyses that they are varieties in which a large portion of the ferrous oxide is replaced by magnesia.

A massive chloritic mineral in aggregations of minute scales, much resembling thuringite, has been found at Mount Pisgah, Iredell county. I have made an analysis of it, but as it was too much oxidized, the amount of ferrous oxide could not be ascertained with accuracy, and therefore a doubt exists as to the species to which it belongs. The analysis gave:

Silicic acid,	24.22
Alumina,	19.34
Ferric oxide,	17.77
Ferrous oxide	20.98
Manganous oxide,	0.07
Magnesia,	5.72
Water,	12.22
	100.32

119. Chloritoid.

In small scales of a greenish black color, disseminated through the slaty pyrophyllite, from Evans' mill in Chatham county. I have made an analysis of the carefully purified scales:

Spec. Grav.,	3.353
Silicic acid,	26.13
Alumina,	40.11
Ferric oxide,	3.44
Ferrous oxide,	23.01
Manganous oxide	trace.
Magnesia,	0.94
Water,	6.91
	100.54

120. Willcoxite.

Greenish and greyish white fine scales of a pearly lustre, much resembling talc, occurs occasionally as the result of the alteration of corundum. One specimen from Shooting Creek, Clay county, is a fragment of a semi-globular mass with a core of white corundum; also in small quantity at Cullakenee, Clay county, and probably at Culsagee, Macon county.

Both, that from Shooting Creek (1), and that from Cullakenee (2), have been analyzed by Geo. A. Koenig:

	1	2
Silicic acid,	28.96	29.50
Alumina,	37.49	37.56
Ferric oxide,	1.26	1.40
Ferrous oxide,	2.44	2.38
Magnesia,	17.35	17.20
Lithia,	trace.	trace.
Soda,	6.73	6.24
Potash,	2.46	2.42
Water,	4.00	3.32
	100.69	100.02

121. Margarite.

In small foliated masses of silver white color and pearly lustre, some

of the folia showing planes of crystals, associated with the corundum at the Culsagee mine (1); it has also been found with the mass of blue corundum found at Marshall, Madison county; but the most beautiful varieties are found at Cullakenee, where it occurs in groups of laminated crystals, sometimes two inches long, one and a-half wide, and five-eighths inches thick, of a slightly pinkish white color and pearly lustre (2). These groups contain sometimes a nucleus of corundum, from which they are derived. The second variety from the same locality occurs in the form of broad laminae, of a pinkish color, intermixed with corundum and associated with zoisite, (3); a third variety from Cullakenee is found in thin seams of a greyish green color, which are an aggregate of minute pearly scales of a greenish white and sea-green color (4). It is found rarely in Hogback mine, Jackson county. The grey corundum from Penland's, Clay county, is surrounded by a white and yellowish white cryptocrystalline and pseudofibrous margarite, and a similar incrustation is found upon the blue corundum at Crowder's mountain.

A peculiar variety of soda margarite, of a compact and cryptocrystalline structure, surrounds the hexagonal corundum crystals from Hendrick's farm, near Belt's Bridge, Iredell county. It has been analyzed in the Laboratory of the University of Pennsylvania by Frank Julian (5). I have analyzed the margarite from Culsagee (1); Thos. M. Chatard the first variety (2), and I the second (3) and third (4) varieties from Cullakenee,

	1	2	3	4	5
Spec. Grav.	3,087	2,990	3,055	3,064	
Silicic acid,	28.11	29,34	30.72	29.63	33.10
Alumina,	49.16	48.73	49.83	51.19	52.20
Chromic oxide,	.....	.....	.....	0.13	.....
Ferrous oxide,	0.43	0.78	0.84	0.59	trace.
Magnesia,	0.45	0.78	0.76	1.09	.....
Lime,	11.08	11.32	10.84	11.28	8.44
Lithia,	0.45	trace.	trace.	.....	.....
Soda,	0.67	2.61	2.19	1.22	2.59
Potash,	0.22	0.10	0.26	0.20	.....
Water,	6.43	6.55	6.21	4.73	4.85
Corundum,	3.31	.....	.....	.....	.....
	100.31	100.21	101.65	100.06	101.18

122. Dudleyite.

In small quantity in soft bronze colored or brownish yellow scales with pearly lustre, slightly exfoliating when heated. They are probably the result of the alteration of margarite, and are found with it rarely at the Cullakenee mine, Clay county.

123. Uranotil.

About one-third of the so-called "gummite," is an admixture of uranotil, but this mineral is also obtained in a nearly pure state by the farther decomposition of the uraninite or rather gummite. It is then found in, apparently amorphous, compact masses, without or with a waxy lustre, and a pale straw, or lemon-yellow color; opaque and of uneven fracture: Sp. Gr. 3.834, incrusting the gummite, but sometimes the whole mass of the nodules changed into uranotil.

The mean result of two analyses which I made is:

Silicic acid,	13.72
Uranic oxide,	66.67
Plumbic oxide,	0.60
Baryta,	0.28
Strontia,	0.13
Lime,	6.67
Phosphoric acid,	0.29
Water,	12.02
	100.38

From the Flat Rock mine, Mitchell county. Found also with gummite, at the Deake, Lewis & McHone mines.

124. Uranochre.

This mineral, closely related to the preceding, is found as a yellow to orange colored incrustation, in the Gibb's mine, Yancey county, and at Flat Rock and Bunchanan mines in Mitchell. K.

125. Zippeite.

This third related species of uranium mineral is reported by Prof. Julien as occurring at the Higdon mine, Macon county. K.

2. *Tantalates, Columbates.*

126. Pyrochlore or Microlite.

Microscopic brownish yellow or honey yellow grains and crystals which appear to be octahedra, with dodecahedral planes, are associated with orthoclase, tourmaline, etc., at Ray's mica mine, on Hurricane mountain, Yancey county, and are probably pyrochlore or perhaps microlite. Larger octahedra are reported to have been found at the Flat Rock mine in Mitchell county, and were called microlite. I have never seen any; those sent to me as such, were garnet.

127. Hatchettolite.

In octahedral crystals with cubical planes, a yellowish brown color, with greyish opalescence, resinous lustre and subconchoidal fracture. Hardness, 5. Spec. Grav., 4.851.

Three analyses of it have been made by J. L. Smith, the mean results of which I give (1), and one by O. D. Allen (2):

	1	2
Tantalic acid, } Columbic acid, }	67.04	29.83 34.24
Titanic acid,	.....	1.61
Tungstic acid, } Stannic acid, }	0.75	0.30
Plumbic oxide,	trace.	trace.
Uranic oxide,	15.61	15.50
Ferrous oxide,	2.24	2.19
Cerous oxide, } Yttria, }	1.17	.....
Magnesia,	.....	0.15
Lime,	7.31	8.87
Soda,	.....	1.37
Potash,	0.86	trace.
Loss by ignition,	4.87	4.49
	99.85	98.55

Found with samarskite at Wiseman's mine, Mitchell county.

128. Tantalite.

A massive variety of tantalite, weighing a few ounces has been collected by the late Prof. F. H. Bradley, in Yancey county. It had a black color, a specific gravity of 6.88; and has been analyzed by W. J. Comstock, who found:

Tantalic acid,	59.92
Niobic acid,	23.63
Ferrous oxide,	12.86
Manganous oxide,	3.06
Magnesia,	0.34
	99.81

It is also described by Hidden as found "in Sharpe township, Alexander county, in a well terminated crystal of *four ounces* in weight. This mineral has but one other American locality, i. e., Coosa county, Alabama. It is a mineral remarkable for its high specific gravity, being heavier than pure iron."

129. Columbite.

It occurs in crystals and crystalline masses of a black color imbedded in the samarskite of Wiseman's mine, Mitchell county. It has also been found at the Deake mine and other localities in the same county, and in Yancey county near Burnsville, and at Balsam Gap mine in Buncombe, and near Franklin in Macon county. One crystal of it was kindly sent me by Mr. J. A. D. Stephenson of Statesville, which he had found at Isaac Price's farm, White Plains, Alexander county. I have a crystal of about 2 inches in length, 1½ in width and ½ in thickness, from Capt. Mills' mine, Burke county, which appears to belong to this species.

J. L. Smith has analyzed the crystals (1), and massive varieties (2) from Wiseman's mine, and I, that from Isaac Price's farm (3):

	1	2	3
Spec. Grav.,	5.562	5.485	5.758
Columbic and tantalic acids,	80.06	80.82	79.90
Tungstic and stannic acids,	1.21	1.02	0.56

Ferrous oxide,	14.14	8.73	15.14
Manganous oxide,	5.21	8.60	5.09
Cupric oxide,	.....	trace.	.....
	100.62	99.17	100.92

130. Yttrotantalite.

According to General Clingman, grains of this mineral have been found in several localities in the Western counties.

131. Samarskite.

It has been found in small black grains and pebbles, sometimes weighing $\frac{1}{4}$ of an ounce, in the gold sands of Rutherford county, which, when broken, had a vitreous resinous lustre and a brownish black color, and a spec. grav. of 5.69. It is found also in the gold sands of Burke (at Capt. Mills') and McDowell counties. It has been analyzed by T. S. Hunt (1).

About five years ago large masses, one of them weighing over 20 pounds, have been found at Wiseman's mine, Mitchell county. Usually in irregularly shaped masses, sometimes coarsely crystallized, rarely in distinct modified rhombic prisms. The color is deep velvet black, in their edges brown, the lustre resinous and the fracture conchoidal. Spec. grav., 5.72.

It has been analyzed by Miss Ellen H. Swallow (now Mrs. Richards) (2), J. L. Smith (3), and O. D. Allen (4):

	1	2	3	4
Columbic acid,	54.81	54.96	55.13	37.20
Tantalic acid,				18.60
Tungstic and stannic acids,	.....	0.16	0.31	0.08
Uranic oxide,	17.03	9.91	10.96	12.46
Ferrous oxide	14.07	14.02	11.74	10.90
Manganous oxide,	.....	0.91	1.53	0.75
Cerous oxide, &c.,	3.95	5.17	4.24	4.25
Yttria,	11.11	12.84	14.49	14.45
Magnesia,	.....	0.52	trace.	.....
Lime,	.....	.....	.....	0.55
Loss by ignition,	0.24	0.66	0.72	1.12
Insoluble,	.....	1.25	.....	.....
	101.21	100.40	99.12	100.36

Dr. Smith expresses his doubts about the true nature of the cerous oxide, &c., separated from the samarskite. This mineral has lately been the subject of investigation by numerous chemists and several new elements, mosandrum, philippium and decipium have been discovered in it. The nature of these has not yet been sufficiently established to understand their exact relations. Samarskite has also been found in small pieces of 1 to 3 ounces at the Grassy Creek mine, Mitchell county, and in McDowell county.

132. Euxenite.

Associated with the samarskite at Wiseman's mine. In reddish brown and hair-brown masses, which are translucent in their fragments, fracture irregular to subconchoidal, lustre resinous, not crystalized. Spec. grav., 4.593—4.642. It has been analyzed by J. L. Smith, who found:

Columbic acid,	54.12
Tungstic and stannic acids,	0.21
Yttria and cerous oxide,	24.10
Lime,	5.53
Uranic oxide,	9.53
Manganous oxide,	0.08
Ferrous oxide,	0.31
Water,	5 70
	99.58

133. Æschynite.

The most perfect crystals of the black minerals from Ray's Mica mine, Yancey county, which have been considered columbite, agree in form and physical properties with æschynite, similar in appearance to that from Miask, Siberia. No analysis has been made. It is reported also from Mitchell county.

134. Rutherfordite.

In monoclinic crystals and grains of a blackish brown color and vitreo-resinous lustre and conchoidal fracture. Sp. Gr., 5.55—5.69.

A partial analysis by T. S. Hunt gave

Titanic acid,	58.5
Lime,	10.0
Not determined,	31.5
	100.00

In the gravel deposits of Rutherford and Burke counties.

135. Fergusonite.

Found by Hidden in the gold sand at Capt. J. C. Mills', Burke county. He sends the following analysis, made by Dr. J. L. Smith:

Columbic acid,	48.12 per cent.
Yttria, with traces of other earths,	40.20 " "
Uranium oxide,	5.81 " "
Iron oxide,	2.75 " "
Water,	1.50 " "
	98.38 " "

"Any little tantalic acid with the columbic acid was not separated." Hidden also reports it as found in Rutherford and Mitchell. K.

136. Rogersite.

In white mamillary crusts and little pearly beads upon samarskite and euxenite at the Wiseman mine, Mitchell county. Spec. Gr., 3.313. It has been analyzed by J. L. Smith, who found

Columbic acid,	18.10	20.21
Yttria, &c.,	60.12	.....
Water,	17.41	16.34

3. *Phosphates, Arsenates, Etc.*

137. Xenotime.

In minute tetragonal pyramids, in the sands from gold washings in Polk, McDowell, Burke and Rutherford counties. In some sands which I have lately received from Capt. Mills' gold mine in Burke

county, there were a few peculiar crystals of a pale greyish, yellowish white color. They were tetragonal pyramids, but were irregular and rough on the planes, and appeared to inclose some foreign substance, perhaps zircons. One had a nucleus of a greenish yellow color and resinous lustre, which resembled monazite. A few tests which have been made with a fragment of a crystal, which appeared pretty uniform in composition, gave a substance resembling zirconia, yttria and phosphoric acid, with a minute trace of cerous oxide.

138. Apatite.

This is a rather rare mineral in this state. I have observed it in imperfect crystals of a greyish and reddish green color in orthoclase, etc., at Ray's mine, Hurricane mountain, Yancey county, and in small granular patches of a greenish color, in granite; found three miles south of the Blue Ridge, sixteen to seventeen miles from Jefferson, on the road to Wilkesboro'; found also in greenish white crystals, often inclosing quartz, sometimes from 2 to 3 inches in length, and nearly one inch in thickness, implanted in albite at Point Pizzle and at Cox's M., Mitchell county, and at the Presnel and Gugenheim mines, Yancey county.

139. Pyromorphite.

This is one of the most beautiful minerals found in North Carolina, and formerly has been quite abundant at the Silver Hill mine, which furnished very handsome specimens of hexagonal prisms and crystalline aggregations of different shades from colorless almost to black, also honey and wax yellow, green, brown, etc.; less abundant, and mostly of a yellowish green color, it is found at Silver Valley, Davidson county. In green and yellowish green crystals, at the Troutman and McMakin mines, in Cabarrus county; also, at the Stewart mine, in Union county, and in minute green crystals in the gold veins of the Baker and Miller mines, Caldwell county.

140. Monazite.

It is found in considerable quantities in small brown, greenish or yellowish brown monoclinic crystals in the gold sands of Rutherford, Polk, Alexander, Burke and McDowell counties; also in the neigh-

borhood of Crowder's mountain, Gaston county, and at Todd's branch, in Mecklenburg county, where it occurs in association with diamond, zircon, etc.

Very fine perfect crystals over an inch long have been lately found by Hidden in Mitchell county. He also found it in mica schist at the Deake mine, Mitchell county, and in feldspar at Ray's mine, Yancey county, and "in *transparent* crystals (var. turnerite) at Milholland's mill, Alexander county, some of the crystals a quarter inch long, and splendent."

141. Vivianite.

Found in dark, bluish green slender crystals in a compact nodule of tertiary marl, in Edgecombe county: analyzed by W. B. Phillips of the Agricultural Chemical Station. It is a new and unnamed variety, resembling anglarite and ludlamite in its percentages of water (14) and iron oxide (56), but differing from both, and occupying an intermediate position between them, in containing equal percentages of both forms of the oxyde—protoxide 28.05, sesquioxide 28.35. K.

142. Olivenite.

Minute green crystals and brownish green fibrous masses, associated with tetrahedrite, scorodite, etc., at George Ludwick's mine, in Cabarrus county, appear to belong to this species.

143. Pseudomalachite.

In reniform and fibrous masses, of a dark emerald green color, at the McGinn and Wilson mines, in Mecklenburg county, Cullen's mine, in Cabarrus county, Fisher Hill mine, in Guilford county, at Clegg's mine, in Chatham county, and about one mile from the Soapstone quarry, in Moore county; also, at the Peach Bottom mine, in Alleghany county.

I have analyzed the pseudomalachite from the McGinn mine, which contains:

Phosphoric acid,	24.58
Cuprie oxide,	68.6
Water,	6.86

144. Lazulite.

In dark blue crystals and crystalline masses, in quartz, and associated with cyanite and damourite at Crowder's and Clubb's mountains, in Gaston county; also, in quartz, and with very little damourite, at Coffee Gap, in the Sauratown mountains, Stokes county. That from Clubb's mountain has been analyzed by Smith and Brush, who found:

Spec. Grav.,	3.122	
Phosphoric acid,	43.18	44.15
Alumina,	31.22	32.17
Ferrous oxide,	8.29	8.05
Magnesia,	10.06	10.02
Water,	5.68	5.50
Silicic acid,	1.07	1.07
	99.70	100.96

145. Scorodite.

In small leek-green and yellowish green crystals, associated with tetrahedrite, quartz, etc., at George Ludwick's mine, in Cabarrus county. It is found in finely granular masses of a brownish yellowish green color, associated with leucopyrite, from the oxidation of which it is formed at Drum's farm on the White Plains, Alexander county, and Dr. Halyburton's, in Iredell county.

146. Wavellite.

Globular and hemispherical aggregations of white and greyish white wavellite, associated with silver, galenite, pyrite, etc., are rarely met with at Silver Hill, Davidson county.

147. Pharmacosiderite.

Exceedingly minute crystals of this mineral, of a browish green color, are associated with the scorodite of George Ludwick's mine, Cabarrus county.

148. Dufrenite.

It is rarely met with in greyish green tufts of silky lustre, with the so-called "black band" iron at Egypt, Chatham county.

149. Phosphuranylite.

In microscopic rectangular pearly scales or in pulverulent incrustations upon quartz, muscovite and feldspar. Deep lemon yellow.

I have made an analysis of a specimen, which appears to have been slightly contaminated with cerussite, and found the composition, after deducting the plumbic oxide, as follows:

Uranic oxide,	76.71
Phosphoric acid,	12.08
Water,	11.21

Associated with autunite and other uranium minerals at the Flat Rock mine and Buchanan mine, Mitchell county.

150. Antunite.

In beautiful nearly square scales or small crystals of a greenish yellow or yellowish green color, upon quartz and feldspar at the Flat Rock and other mines, Mitchell county; Hidden also reports it from Alexander county.

151. Nitre.

Crystalline crusts on mica slate at Nantehaleh river, in Cherokee county.

5. *Tungstates, Molybdates, &c.*

152. Wolframite.

In laminated masses with cuproscheelite and scheelite at the Cosby mine, and with barite, at the Flowe mine, both in Cabarrus county;

also according to General Clingman, frequent in Rutherford and Burke counties.

I have made an analysis of the wolfram, which forms the nuclei in the rhombic tungstate of lime and found:

Spec. Grav.	7.496
Ferrous oxide,	19.80
Manganous oxide,	5.35
Lime,	0.32
Stannic acid,	trace.
Tungstic acid,	75.79
	101.26

153. Rhombic Tungstate of Lime.

Associated with wolframite, in barite, at the Flowe mine, in Cabarrus county, in small crystals and laminated masses of a yellowish and greyish color, which frequently contain a nucleus of wolfram.

154. Scheelite.

Orange colored tetragonal pyramids are found at the Flowe mine; yellowish brown and greyish, imperfect crystalline masses at the Cosby mine, also at Cullen's mine, Cabarrus county, in rounded granular patches of a greyish yellow color, with auriferous pyrite in quartz. I have analyzed the latter and found them composed of

Stanic acid,	0.13
Tungstic acid,	79.52
Cupric Oxide,	0.08
Ferric oxide,	0.18
Lime,	19.13
	99.22

155. Cuproscheelite.

In yellowish green and siskin green pulverulent coatings upon scheelite at the Cosby mine, Cabarrus county.

156. Stolzite.

A few small tetragonal pyramids of a bluish grey, and one small, somewhat barrel-shaped crystal of a greyish yellow color of this very rare mineral have been found in a lump of quartz, associated with sphalerite at Silver Hill, Davidson county.

6. *Sulphates, Chromates, &c.*

157. Barite.

In small white tabular crystals, with pyromorphite and manganese ores at the McMakin mine, Phœnix mine, and White's mine, Cabarbus county. The laminated and coarsely granular white variety at the Flowe mine and Orchard vein, in Cabarrus county; a vein of the coarsely laminated, greyish white barite, at the Latta mine, near Hillsboro', Orange county. It occurs coarsely granular, and has the appearance of white marble, at Colonel Walkup's, Union county. A vein of very white compact and granular barite of from seven to eight feet in width, has been found at Crowder's mountain, Gaston county; west of the Blue Ridge, a vein of eight feet in width, exists at Chandlers', nine miles below Marshall, in Madison county, where it is white and greyish white in color, and of a granular structure, containing small patches of laminated barite, also on Elkin creek, in Wilkes county.

158. Anglesite.

In small tabular rhombic prisms, with very few additional planes in the brown granular zincblende of Silver Hill, Davidson; also, according to General Clingman, at the Baker mine, in Caldwell county.

159. Crocoite.

I have observed this rare mineral in small cavities of saccharoida quartz, from Nash county, in very minute dark hyacinth red cyrstals, associated with gold and small quantities of galenite.

160. Melanterite.

As the result of the decomposition of pyrite, disseminated through many of the mica-slates, etc., of Rutherford, Cleveland and other counties, melanterite or copperas is formed, but no good crystallized specimens have come to my notice.

161. Goslarite.

In the water of the Silver Hill mine, also in fine fibrous crystalline masses upon sphalerite formerly at the McMakin mine, Cabarrus county.

162. Chalcanthite.

Very fine crystals, granular and fibrous crystalline masses of sulphate of copper, were formerly obtained from the upper works of the Silver Hill mine, Davidson county, principally at the sixty feet level.

163. Alunogen.

I have once seen a beautiful specimen of fibrous, silky alunogen of the western counties, but could not learn the exact locality from which it came. It is found abundantly associated with melanterite, in Rutherford, Cleveland and other counties, but not in good specimens; also in Iredell and Catawba counties.

164. Jarosite.

The impure variety generally called "Misy," has been observed in association with galenite and pyrite, at Flint Knob, Wilkes county.

165. Montanite.

This very rare tellurate of bismuth has been found with tetradymite at David Beck's mine in Davidson county, and at Captain Mills', in Burke county. The yellow oxide of bismuth, observed by Dr. Asbury, at the Asbury vein, in Gaston county, may belong to this species.

An analysis, which I have made of that from Davidson county gave

Ferric oxide,	1.26
Cupric oxide,	1.04
Bismuthic oxide,	68.78
Telluric acid,	25.45
Water,	3.47
	100.00

7. *Carbonates.*

166. Calcite.

Perfect crystals are found at Whiteville, Columbus county, in marl and in the Clegg mine, Chatham county. It occurs coarsely granular in a vein at Hoover's mine, about six miles from Silver Hill, at Moore's mine, ten miles southeast of Lexington, in Ore Knob mine, Ashe county, and rarely at Silver Hill, in Davidson county, and the Steele mine, Montgomery county. Small quantities of granular calcite were found in digging a well at Morrisville, Wake county. The granular varieties, which constitute marble, are sometimes found associated with the compact varieties of limestone in the band which passes through North Carolina, from Stokes county, through Catawba, Lincoln and Gaston counties, as, for instance, at the quarries of Martin on Snow creek, of Bolejack, near Germanton, in Stokes county, Pfaff, in Forsyth, Hooper in Catawba, and Stowe in Lincoln counties, and in the Eocene limestone of New Hanover county. A coarse granular limestone occurs also at Goshen, and at Haskett's, on Ellijay Cr., Macon county, and on Cullowhee Cr., Jackson county, and again on Bear Cr., and Walnut Cr., and at Marshall, in Madison county. A veined grey and white marble is found at Powell's Quarry, near Catawba Station, Catawba county. Very beautiful varieties of white, pink and grey marble are found abundantly at the Nantehaleh river, Marble creek, Valley river, and other places in Cherokee county. A band of compact limestone, sometimes finely granular, is found in Turkey Cove, and Cedar Cove, and on Linville mountain, and Graveyard mountain in McDowell county, also in Jackson, Transylvania and Henderson counties, and at Warm Springs, and on Shut In Cr., and Laurel River, Madison county. It is also found in small seams and crystalline

grains, replacing in part, the orthoclase of a massive granitic gneiss in Harnett county.

167. Dolomite.

Granular dolomite of a greyish white color, resembling marble, is found on Valley river, ten miles from Murphy, Cherokee county.

168. Magnesite.

The lamellar white and greyish variety, from which distinct cleavage crystals can be obtained, is found at McMakin's mine, Cabarrus county; also, with chrysolite at Webster, Jackson county, and Hampton's, Mining Creek, Yancey county. At the latter locality are also found the white compact, and at Webster, the white earthy and pulverulent varieties. Breunerite occurs in serpentine, 4 miles S. of Morganton, Burke county, and near Dobson, Surry county.

169. Siderite.

In fine rhombohedral crystals, formerly at the McCulloch, the North Carolina, and several other mines in Guilford county, where it occurred in considerable masses in the vein. In the same manner it is of frequent occurrence in many of the gold veins of the State, especially in those which carry copper. It often forms almost the whole mass of the veins, frequently, however, decomposed into limonite, which still retains its rhombohedral form; for instance, at Conrad Hill in Davidson county, and in Gaston county, at some of the mines in Randolph county, and the Cosby mine in Cabarrus county. In smaller quantities it has been observed in Stokes county. and some of the mines in Mecklenburg and in Alexander county. A white cleavable variety occurs at the Rudisill mine, near Charlotte. The earthy and argillaceous varieties of siderite forms large beds in the Triassic coal strata and constitute the so-called black band or ball ore at Farmville, Egypt, the Gulf, etc., in Chatham county. It is also found in compact, greyish brown nodules in Halifax and Granville counties.

170. Rhodochrosite.

In small globular pink and rose-red concretions, with earthy man-

ganese near Franklin in Macon county, also mixed with magnesite, talc, etc., in compact and granular masses at the McMakin mine, Cabarrus county.

171. Cerussite.

The most beautiful crystallizations, single individuals as well as twins, have been found at Silver Hill, immediately after the discovery of the mine, also white, yellowish and greenish white, compact varieties, frequently highly argentiferous. A very interesting occurrence at the same mine is cerussite, pseudomorphous after pyrite. Yellowish white columnar cerussite occurs in Gaston county. Rhombic prisms with pyramidal planes, together with imperfect crystallizations and earthy masses, are found at Clegg's mine, Chatham county. At Elk creek, in Wilkes county, earthy cerussite has been observed, coating galenite. It is also found at Baker mine in Caldwell county, and at Murphy, Cherokee county.

172. Malachite.

Malachite, in its varieties, fibrous, compact and earthy, being the result of the decomposition of other copper ores, is found in association with the latter in almost every copper mine in the State. The Guilford, Cabarrus and Mecklenburg county copper mines contain it. I have observed the fibrous variety at Silver Hill and Conrad Hill in Davidson county, the Gillis mine in Person county, the Cheek mine in Moore county, and both the fibrous and earthy malachite at Clegg's mine in Chatham county. It has been found in the Brushy Mountains, Alexander county, the Peach Bottom mine, Alleghany county, the Ore Knob mine in Ashe county, the Gap Creek mine in Watauga county, the Cullowhee, Savannah, and Waryhut mines in Jackson county, near Sassafras Fork in Granville county, and many other localities too numerous to be mentioned. Pseudomorphs of malachite, after cubical cuprite, have been found at Cullen's mine, Cabarrus county.

173. Azurite.

This variety of carbonate of copper is far less frequently met with. Small, but very beautiful and perfect crystals are found at Clegg's mine and at Snipes' (iron) mine in Chatham county, and at the Cheek mine in Moore county. It is rare at the Cullen and Boger mine in Cabarrus county, and the Wilson mine in Mecklenburg county, and at Wells', Gaston county.

174. Bismutite.

In yellowish white concretions, often of a pearly lustre or white incrustations upon gold-bearing quartz, at the Asbury mine in Gaston county, where it has been discovered by Dr. Asbury.

Mineral Coal.

175. Anthracite.

A very interesting occurrence of anthracite is that of masses with conchoidal fracture in the vein rock at the Clegg mine in Chatham county. The bituminous coal, both of the Deep an Dan rivers is frequently, especially near trap-dykes, almost deprived of its hydrocarbons, often approaching true anthracite.

176. Bituminous Coal.

The greater portion of the coal in the Deep river beds is bituminous coal, the volatile matter varying from about eight to thirty-two per cent. The Dan river coal, which I had opportunity to examine, is so-called semi-bituminous coal, that from near Stokesburg, Stokes county, containing about ten per cent of volatile matter.

177. Lignite or Brown Coal.

Frequently met with in the marl beds of the Eastern counties, and

in the Trias of Granville county, on Tar river, and on Brown's creek, Anson county.

Organic Compounds.

178. Succinite.

Found in lumps, of several ounces weight, in Pitt county and elsewhere, in the Tertiary marl beds of the eastern counties. K.

ADDENDUM.

At my request Mr. W. E. Hidden has prepared the following account of some of the results of his recent explorations in the State in search of valuable and rare minerals.

Stony Point, Alexander Co., N. C.,
November 20th, 1880.

Prof. W. C. Kerr,
State Geologist of North Carolina:

Sir:

I herewith submit to you a few facts which were noticed in my search for platinum in this State. My platinum hunt was in the interest of the famous inventor, Thomas A. Edison, who had given me "carte blanche" to visit and inspect the Southern gold placers of the United States, with the sole idea of testing them for platinum.

In regard to the success of my search, I will state *that at the many places where I operated I did not succeed in finding any traces of its existence.* The five reported localities in this state were carefully examined without success.

While examining these auriferous gravels for platinum, I would occasionally notice in my pannings some crystals of minerals of great interest to science. The Brindletown gold district of Burke county proved to be the most interesting locality in this connexion. No less

than forty-five distinct mineral species were selected from these gravels in my short stay there. I beg leave to mention in detail the most interesting of them:

OCTAHEDRITE, (Anatase):

I discovered here in flat tabular crystals of *unusual* size and having great brilliancy. A few *transparent* (!) glassy crystals were found of a pale green color. Some were *highly modified* and splendent. The prismatic cleavage was often observed. This mineral is one of the three occurring forms of titanic acid; its only other locality in the United States is Smithfield, R. I., where the crystals are very small and rare.

BROOKITE:

Many beautiful crystals of this form of titanic acid were found here also. Their color varied from dull yellow to brown, a few being of a fine red with highly modified terminations. The crystals are all small.

FERGUSONITE, (A columbate of yttra and allied earths):

This very rare mineral I found to exist here quite abundantly. As many as three hundred crystals were found altogether in my search. The occurring form is a very acute octahedron with the basal plane. Hemihedral planes common, color brown black. Crystals mostly covered with a gray crust. Thin splinters reddish brown. Fracture conchoidal, brilliant. Sp. grav., 5.87, (Dr. J. L. Smith). This is the only American locality where this rare mineral can be readily obtained. It has been found at Rockport, Mass., (very sparingly) in granite.

MONAZITE:

(Phosphate of cerium, lanthanum, etc., with a trace of tin.) This mineral is particularly abundant at Capt. J. C. Mills' mine, in Burke county. I sent Mr. Edison over fifty pounds of gravel washings from this mine that was sixty per cent. monazite. Fourteen ounces of *chemically pure monazite* were obtained by sifting old tailings and picking out by hand the largest crystals. Mr. Edison desired this mineral for the oxide of thorinum which it sometimes contains; he was successful in finding it in this N. C. monazite, for his experiments.

I was particularly struck by the very common occurrence of this mineral in the gold gravels of this State. Burke county seems to have it most abundantly, but I found it quite common in McDowell, Yancey, Mitchell, Rutherford and Polk counties. I believe that pannings from *any* of the branches in Burke, Rutherford or Polk counties, will bring it to light.

The crystals are usually well formed and vary considerably in

habit; they are commonly very small, though some at Capt. Mills' mine were one quarter inch in width and length.

XENOTIME, (A phosphate yttria.):

I found somewhat abundant in Burke county, at Brindletown. The crystals were low octahedrons; color, light grey to light brown; cleavage prismatic. Crystals minute to *one-half inch diameter.* Rutherford, McDowell and Polk counties afford them. I obtained about 100 crystals in all.

I found on examination of the Burke tenotimes, that some of them had a central core of zircon, which was *symmetrically* compounded with them, like those from Hitteroe, in Norway. This is the first discovery of this compound form outside of the Norway locality.

A trip to Mitchell county resulted in the adding to my cabinet of some very remarkable mineral specimens from the mica mines of that region. Of Hatchettolite, (the new variety of *microlite*, by Dr. J. L. Smith,) I was able to obtain crystals from an eighth to *three quarters* of an inch in diameter, having the planes 33, *i*, 1 and 0.

MONAZITE:

The crystals I discovered in Mitchell county were well formed and of uncommon size. One measured one and a half inches long by three quarters wide, and was one of a group. This size is exceptional for this country, or even this mineral. The Mitchell monazite is "in situ" in mica-schist, at the Deake mine. The Yancey county monazite I found at the Ray mica mine, embedded in feldspar, the crystals were very beautiful and complex in form, with sp. grav. 5.243.

URANINITE, (*Pitchblende*):

Pure and unaltered, in masses of several ounces weight. And in cubes and cubo-octahedrons embedded in feldspar, and often coated with autunite or gummite.

ÆSCHYNITE (?):

In deeply striated prisms in feldspar, associated with Apatite and Beryl.

GUMMITE:

Pseudomorphs (cubes and octahedrous) after uraninite were quite common at the time of my visit. A mass weighing 6 lbs. and 6 oz., the largest yet discovered, came into my possession lately; it is partly unaltered uraninite.

The beauty of some of this N. C. gummite (hydrous oxide of uranium) is especially worthy of note. It varies from the *brightest lemon yellow to the richest shade of deep orange-red,* and often with a core of velvet black uraninite in the larger pieces.

The Flat-Rock, Deake and Lewis mine are the best mines for procuring gummite from at the present writing. At the latter, it can be had in the matrix.

Samarskite, columbite, zircon, garnet, autunite, beryl (one *fine* blue crystal, doubly terminated, of ten pounds weight)! and dark *green* tourmaline were also obtained.

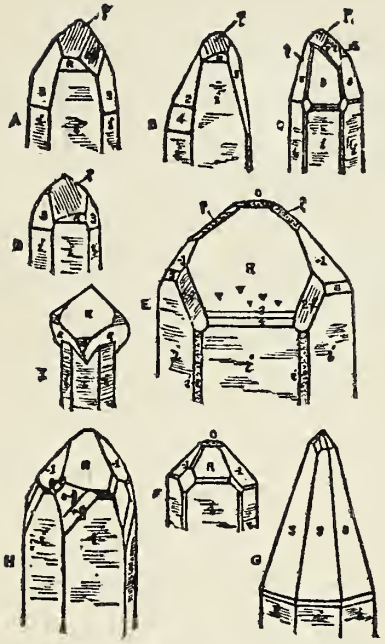
In Yancey county, at Wm. Hampton's, fine epidote (!) in very complex forms. Chromite, yielding upon analysis 41 per cent., 47 per cent., 48 per cent., 51 per cent., and 54 per cent., oxide of chrominum. An average analysis on 2,000 pounds of loose chromite, found on the surface, and shipped to New York by the writer, yielded 47.63 per cent. chromic oxide. Consumers of chromite require a 50 per cent. ore.

SPODUMENE :

Has been occasionally found for some years past, on the J. W. Warren plantation, loose in the soil. It has passed under the name of diopside, so much did it resemble it and so unlike was it from any previously discovered spodumene (!). The crystals are small but beautifully transparent (!) Their color varies between a yellowish and a deep chrome green! Form, long prismatic, with rounded terminations. Twins common. It is associated with beryl (grass green), orthoclase, pyrite and quartz crystals (which enclose the spodumene sometimes) in a very narrow vein.

I have sunk a shaft twenty-five feet on this vein.

This new variety of spodumene is to that species precisely what emerald is to the species beryl. It possesses the characteristics that are considered vital in a gem stone (!) *i. e.* beauty, hardness, transparency and rarity (!) Strong hopes are entertained of its being found of a sufficient size for cutting.



ALEXANDER COUNTY QUARTZ CRYSTALS.

Figures A, B, C and D are examples of crystals *terminated by planes in the* 2-2 *zone*, which feature, as far as the writer can gather from the literature on the species, is *new* to science. Crystals having this very interesting feature, I have only observed in the counties of Iredell, Catawba, Burke and Alexander in this State, and at Cumberland, R. I. The series of planes *above* 2-2 are mostly rounded, but commonly have a good polish. They are invariably striated parallel to the edge of 2-2. They occur both *right and left handed.* Figs A and C being *right*, B and D *left.*

The first four figures are interesting also in other occurring *rare planes.*

Fig. C. This crystal is of special interest. The edge between 3 and 3 being *replaced* and having the *di-hexagonal prism* (*i*-2.)

Fig. 3. Special attention is called to the basal truncation, and to the replacement of the edge between R and R, by a plane in the—$\frac{1}{2}$ zone. Also to certain *inverted* triangular markings, like those on crystals of diamond. The O plane and the (new?) plane in the—$\frac{1}{2}$ zone occur usually *rough.*

Fig. F has much the same interest as E, but has the edge replaced between—1 and R, the di-hexagonal pyramid.

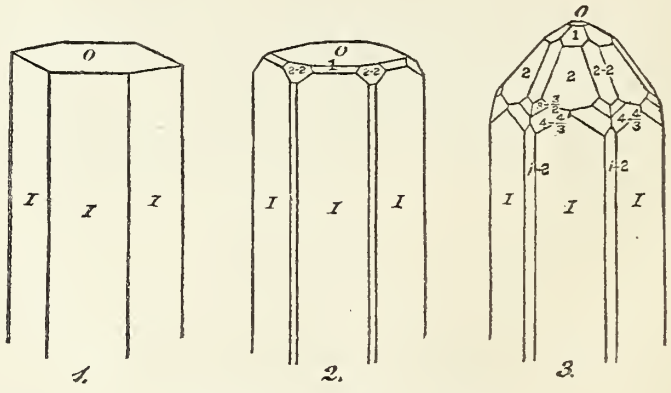
Fig. G, a crystal terminated almost wholly by the rhombohedral plane 3. A magnificent example of this rare form is in the cabinet of Mr. J. Adlai Stephenson, of Statesville.

Fig. H, a crystal having the planes 2–2, 3-$\frac{3}{2}$, and 4-$\frac{4}{3}$, bevelling *every* prismatic face at its intersection with the terminal plane. It is also modified otherwise interestingly. This crystal was perfectly pellucid, had a beautiful *yellow tint*, with *all the planes lustrous as those of a gem.*

Fig. I is ideal, but illustrates a form not uncommon in the county. Often the cap or terminal crystal is strongly in contrast with the prism in the points of color and transparency. Large groups are often forms showing this *second growth in parallel position.* One group of gray opaque crystals was capped with beautiful amethysts. All the figures, excepting I, were drawn directly from the crystals and are natural size.

The determinations of planes were made with a common hand goniometer, (the results compared with angles recorded in Dana's Manual of Min.), my lettering, therefore, may be only approximately correct.

My collection embraces many crystals from this county of all the types in the plate.



ALEXANDER COUNTY BERYLS.

Figures 1 and 3 represent the extremes in form of the Alexander county beryls. This extraordinary crystal was at first mistaken for

a quartz crystal. It was quite small, clear, had both ends terminated and but a slight tint of green.

Figure 2 is the most common form at the locality on the J. Warren farm. They occur green, (light emerald), yellow, bluish green, bluish and sometimes in limpid colorless crystals. Often the crystals are highly modified, resembling those from Siberia, (figs. 2 and 3.)

On the Warren plantation particularly, a few fine beryls of a light chrome green color have been found loose in the soil, having prisms of six and twelve sides, and perfect terminations; they have a characteristic feature of apparently having been filed across the prismatic faces. As yet they have not been found of sufficient depth of color or transparency for gems, but as cabinet specimens they are not surpassed in beauty by any beryls heretofore found in this country. They are found implanted in cavities and not embedded in a matrix, as is the usual case with beryls.

Respectfully submitted,

WM. EARL HIDDEN.

SYNOPSIS

OF

MINERALS AND MINERAL LOCALITIES BY COUNTIES.

Alamance.

Graham—McAden mine, gold; pyrite.

Newlin's—Gold; pyrite; chalcopyrite.

Holt mine—Gold; also at Anthony mine.

Dixon's mine—On both sides of Haw river, in placers; Boyd M, in placers.

Cane Creek Mountains—Gold; epidote; chalcedony; magnetite.

Alexander.

White Plains—Scorodite; columbite; tourmaline, (Lackey's & Prices'); beryl (at Warren's, Lackey's, and Prices'); rose quartz; smoky quartz, also near Taylorsville; rutile, geniculated crystals, and acicular crystals in limonite and in quartz; the latter also near Poplar Springs; spodumene, grass green crystals, at J. W. Warren's.

Price & Keever place—Beryl; tourmaline; columbite; autunite; muscovite.

Lead mine—Amethyst.

Roseman's farm—Milky quartz.

Stony Point—Monazite, in fine crystals; spodumene, fine transparent green crystals.

Marshall's farm—Garnets, two feet diameter.

Brushy Mts.—Malachite; chalcopyrite; graphite asbestos; tabular quartz.

Elsewhere—Green, brown and black tourmaline; graphite; magnetite; tantalite; beryl, yellow, blue, green; quartz crystals with basal plane, also with other singular modifications, also smoky, yellow and milky; monazite, var. turnerite; asbestos; pyrite; magnetite; chalco-

pyrite; pyrolusite; limonite, pseudomorphous after siderite; siderite; kaolinite; orthoclase, large crystals, (one of forty pounds); biotite; muscovite; rutile, very fine at Milholland's mill and at Robt. Johnson's; tourmaline at B. Lyon's, with unusal terminal angles, (Hidden).

Barrett Mt.—Graphite.

Alleghany.

Peach Bottom mine—Pyrite; chalcopyrite; malachite; galenite; cuprite; sphalerite; molydenite.

Roaring Gap—At H. Harris', calchopyrite (auriferous); bornite.

T. Bryan's—Pyrite.

Bullhead Mt.—Cyanite; magnetite; garnet.

Elsewhere—Graphite; chrysolite; gold, in placers; martite; pyrite; calcite; zoisite.

Anson.

Gold, in vein, 2 miles south of Wadesboro.

Quartz crystals, of considerable size, at several points.

Lignite at Boggan's Cut.

Ashe.

Blue Ridge, S. of Jefferson—Muscovite; black tourmaline.

Horse Creek—At Hampton's, epidote; magnetite; manganese garnet. At Graybill's: magnetite; epidote.

Helton Creek, near mouth—Magnetite at Ballou's.

Ore Knob mine—Pyrite; calcite; chalcocite; arsenopyrite; malachite; metallic copper.

Jefferson—Pyrite; chalcopyrite, 2 and 6 miles distant; graphite in gneiss; chlorite at Willis' mine; muscovite, 6 miles, large plates; 3 miles east and at Mulatto mountain, chalcopyrite.

Three Top mountain—Tremolite.

New River, South Fork near mouth—Chrysolite; chalcopyrite, magnetite.

Gap Creek (Copper Knob mine)—Gold; silver; hematite; epidote; bornite; chalcocite; chalcopyrite; chrysocolla; malachite.

Elsewhere—Azurite; cuprite; actinolite; talc; chlorite; asbestos; graphite.

BEAUFORT.

Siderite, in nodules; calcite in marl beds, and in Eocene, (bottom of Pamlico river, and on Blount's farm.)

BERTIE.

Calcite, in marl beds.

BLADEN.

Calcite, in marl beds.

BRUNSWICK.

Calcite, in marl beds; glauconite, in green sand.

BUNCOMBE.

Asheville—Meteoric iron (!); garnet; magnetite, at L. W. Sams'; ferrous chloride (!), in the meteorite; ochreous hematite; hornstone; serpentine; barite (!), granular, on Fox Branch, 10 miles below Asheville.

Balsam Gap mine—Allanite (!); beryl; muscovite; biotite; albite; margarodite; black garnet; columbite.

Cane Creek—Calcite; gold; hematite; limonite.

Ivy River—Chrysolite; chromite; hornstone, genthite; talc; asbestos; tremolite.

Brushy Mountain mine—Muscovite; kaolinite; orthoclase; albite.

Ream's Creek—Garnet, large crystals.

Burnet mine—Muscovite; orthoclase crystals, large, (100 to 1,000 lbs).

N. P. Watkins'—Corundum; cyanite; damourite; tourmaline; garnet.

French Broad River—6 miles north of Asheville, meteoric iron (!).

Hominy Creek—Biotite.

Pisgah Mountain—10 miles S. W. of Asheville, meteoric iron (!).

Turkey Creek—Limonite; magnetite; chlorite; talc.

Swannanoa Gap—Corundum in cyanite (!); damourite; 2 miles S. W. from Gap, limonite.

Swannanoa River—Near Asheville, meteoric iron (!) with triolite; actinolite; black hornblende; 9 miles E. of Asheville, serpentine.

Geo. Alexander's—At mica mine, beryl; muscovite; kaolinite.

Elsewhere—Gold; tourmaline; massive, 6 miles S. of Asheville, and on French Broad, near Buck Shoal; garnet; hematite; galenite, at L. Fortune's; muscovite in many mica mines; beryl, blue; talc; columbite; garnet; menaccanite; bed of limonite, at Blackwell's, 12 miles W. of Asheville.

Burke.

Brindletown—At Col. J. C. Mills', gold; tetradymite; brookite; smoky quartz; chromite; anatase; beryl; tourmaline, black and green; pyrope; zircon; epidote; fibrolite; columbite; samarskite; xenotime; monazite; montanite; fergusonite; rutherfordite; talc; tremolite; magnetite; limonite; mennaccanite; hematite; tellurium; asbestos; cyanite: corundum; graphite; rutile; actinolite. In the gold gravel and sands of the county occur: gold; palladium (?); corundum, menaccanite; chromite; rutile; anatase; brookite (!); pyrope; zircon(!); epidote; tourmaline, black and green; fibrolite; xenotime (!); monazite (!); wolframite (?); limonite; magnetite; hematite.

Brown Mountain—Platinum, on Gen. Hoke's farm; fluorite; limonite; magnetite; albite; kaolinite; gold, in placers.

Linville Mountain—Menaccanite; hematite; itacolumite(!); radiated pyrophyllite; limonite; graphite.

Bridgewater—Manganese garnet; gold.

Morganton—Lead, 4 miles north; corundum altered into damourite; quartz crystals; titanite at Morganton Springs.

Pax Hill—Gold (!); galenite.

Scott's Hill—Gold; silver; cerargyrite; psilomelane; zircon; pyrite.

Shoup's Ford—Beryl; garnet; corundum, in part altered to fibrolite (!); gold; magnetite; menaccanite; cyanite; tourmaline.

South Mountains—quartz crystals, inclosing liquid (!); garnet in trapezohedral crystals (!); graphite, 8 miles S. E. of Morganton; Col. Gaither's 12 miles S. of M., gold in veins and placers; beryl (!) yellowish green and deep green (aquamarine) 9 miles S. E. of Morganton; tourmaline (!) 16 miles S. E. of Morganton; 4–6 miles S. of Morganton, serpentine; talc; chlorite; actinolite; hematite; magnetite; asbestos; magnesite; breunerite; chrysolite; garnet; tremolite.

Sugar Mountains—Quartz crystals, double terminations, &c.; asbestos; gold; rutile; magnetite; beryl.

R. Havenar's farm—tourmaline; muscovite.

J. Huffman's farm—Beryl; epidote; actinolite.

Laurel road—9 miles from M., garnets, large.

J. London's farm—Epidote; garnet; pyrite; gold.

Tate's farm—gold in placers.

G. Deitz's farm—Beryl; tourmaline; albite; sagenite.

Hildebrand's farm—Sagenite; beryl; asbestos; rutile.

Van Horn's farm—Quartz crystals, inclosing fluid; quartz crystals, with basal plane; quartz crystals, smoky; sagenite; garnet.

[The last eight localities are furnished by Humphreys.]

Elsewhere—Electrum; tellurium (Hidden); lithomarge; paragonite, common in the schists of the eastern section of county.

Cabarrus.

Gold in many veins and placers; meteoric stone; sulphur; chalcopyrite; magnetite; limonite.

Dan'l Barnhardt's farm—Barnhardite.

Barringer's mine—Gold; arsenopyrite.

Boger's mine—Tetradymite (!); chalcopyrite; azurite.

Concord—Rose quartz; hyalite; agate, (also at Harrisburg); chalcopyrite; malachite; gold; bornite; asbestos, in rose quartz; tourmaline; magnetite.

Cosby's mine—stilpnomelane (?); wolframite; scheelite (!); cuproscheelite; siderite.

Cullen's mine—Tetradymite (!); cuprite in cubes (!); pseudomalachite; scheelite (!); malachite, in part pseudomorphous after cuprite(!); azurite.

Flowe's mine—Wolframite (!); rhombic tungstate of lime (!); scheelite (!); barite.

Near Gold Hill—Manganese garnet; magnetite.

House's mill—Hematite.

Geo. Ludwick's mine—Gold; arsenopyrite (!); tetrahedrite (!); scorodite (!); pharmacosiderite; olivenite; pyrite; chalcopyrite.

McMakin's mine—Silver; argentite; galenite; sphalerite; proustite (?); tetrahedrite, var. freibergite (! !); pyrolusite; pyromorphite; barite; goslarite; rhodochrosite; magnesite.

Phœnix mine—Gold; tetradymite (!); in Orchard vein, barite; pyrite; chalcopyrite.

Love mine, North Barrier, Furness, Elwood and *No.* 3, a group of mines around *Phœnix*—Gold; pyrite; chalcopyrite.

Long's mine—Gold; pyrite; chalcopyrite; galenite.

Crowell's mine—Gold; pyrite; galenite.

Newell mine—Gold; pyrite; chalcopyrite.

Pharr mine—Gold, in veins and placers; pyrite; chalcopyrite.

Fisher mine—Near Concord: gold; pyrite; chalcopyrite.

Blackwelder mine—Gold.

Barrier mines—North, Middle and South B: Gold; pyrite.

California mine—Gold; pyrite.

Pioneer mills—Molybdenite; chalcocite; chalcopyrite; barnhardite; molybdite; chrysocolla.

Reed's mine—Gold (! !).

Troutman's mine—Sphalerite; pyromorphite.

Union mine—Copper in arborescent crystals! and plates; chalcocite; chalcopyrite; cuprite (!), in octahedra; malachite, fibrous.

White's mine—Chalcopyrite; aikinite (?).

Elsewhere—Gold; pyrite; agate; barite; galenite; sphalerite; magnetite; steatite.

Caldwell.

Baker's mine—Galenite; serpentine; chrysotile (!); pyromorphite; anglesite; cerussite; asbestos; marmolite.

Buffalo river—Patterson's mill, pyrite in quartz.

Lenoir—Magnetite; psilomelane, 4 miles west: 6 miles east, asbestos; tremolite.

Little John mine—Gold (!); galenite; graphite.

Miller's mine—Gold; galenite: pyromorphite.

Fort Defiance—Tourmaline; beryl; graphite; garnet.

Patterson—Magnetite; hematite; menaccanite; compact serpentine.

Wilson's creek—Near mouth, serpentine; talc.

Upper creek—Gold; tourmaline; limonite.

Grandmother Mt.—Near, gold in placers; pyrite; quartz.

Tuttle's mine—Gold in placers.

Richlands—Magnetite; hematite; chlorite; serpentine; talc; martite.

Middle Little river—Limonite; paragonite; damourite; hematite.

Lower creek—Gold, in the gravel of most of its tributaries below Lenoir.

Elsewhere—Gold, in placers and veins; sulphur; cuprite; pyrite; quartz crystals; epidote; muscovite; orthoclase; cyanite; malachite; tourmaline; paragonite, common in schists; damourite; hematite; limonite; chlorite; tremolite.

Camden.

Calcite in marl beds.

Carteret.

Calcite in marl beds.

Caswell.

Metoric iron (!); garnet; magnetite.

Leasburg—Albite (?) 3 miles west of Leasburg; fibrous tourmaline (!); chlorite; epidote.

Catawba.

Ball creek mine—Magnetite; kaolinite.

Roberson mine—Magnetite.

Abernathy mine—Magnetite.

Littlejohn's mine—Limonite; hematite.

Hickory—Graphite, (crystalized); pyrite (!) in cubical crystals; hematite; pyrolusite; limonite; quartz crystals; amethyst (!); garnet (!); muscovite; pyrrhotite; magnetite; chalcopyrite.

Hooper's Quarry—Calcite, granular; pyrite; gold; graphite.

Newton—Magnetite, at Barringer mine, and Forney mine.

Powell's Quarry—Calcite, granular (!); pyrite.

Shuford's mine—Gold; pyrite.

Shuford's Quarry—Calcite; magnetite; rose quartz.

South Mts—Graphite; cyanite; garnet.

Anderson's Mt.—Magnetite; calcite.

Forney's mine—Magnetite.

Beard's mine—Magnetite.

Powell's Factory—Manganese garnet.

Elsewhere—Gold, in placers and veins; graphite; rutile in acicular

crystals in amethyst (!); rock crystal (!); quartz crystals inclosing liquid (!); beryl (!); garnet (!); cyanite; kaolinite; alunogen; wad; rutile (sagenite) at D. Lutz's; beryl; paragonite, common in the schistose rocks.

New Localities—(Humphrey's):

E. Balch's farm—Muscovite; garnets; amethyst; smoky quartz crystals containing liquid; crystals of quartz with basal plane; graphite; black and brown tourmaline; rutile (acicular); beryl, (blue, green, yellow); feldspar.

H. Balch's farm—Liquid bearing quartz crystals; gold; sagenite.

Widow Balch's farm—Sagenite; liquid bearing quartz crystals, with basal plane; tourmaline; rose quartz.

Rev. Huffman's farm—Tessellated quartz crystals; do. liquid bearing; menaccanite; sagenite.

Spencer's farm—Quartz crystals doubly terminated; do. liquid bearing; do. enclosing mica; do. asbestos; do. pyrite; rutile in quartz crystals; amethyst; cyanite; tourmaline; magnetite.

Near Canova—Smoky quartz crystals, large; crystals of amethyst, doubly terminated, enclosing rutile (yellow).

Chatham.

Buckhorn—Hematite, foliated. granular and micaceous; *magnetite; rutile* in quartz; manganese garnet; muscovite; psilomelane; limonite; epidote.

Carbonton—Pyrophyllite slate!

Clegg's Mine—Galenite; bornite; chalcopyrite; pyrite in cubo-octahedra; cuprite; chrysocolla; pseudomalachite (!); cerussite (!); malachite (!) fibrous and earthy; azurite; anthracite; calcite.

Deep River—Pyrophillite slate (!); anthracite: bituminous coal.

Egypt—Siderite, (black band and ball ore); dufrenite (!)

Evans' Mine—Hematite; chloritoid in pyrophillite slate.

Unthank's Mine—Magnetite.

Farmville—Siderite (!) (black band and ball ore): bituminous coal.

Gulf—Siderite, (black band and ball ore); bituminous coal; limonite.

Lockville—7 ms. W. of L., foliated and micaceous hematite; 6 ms. S. E. of L., fine granular and compact hematite.

Kelly's Ore Bed—Hematite (!)

Glass' Mine—Magnetite.

Ore Hill—Hematite, compact, foliated and micaceous; limonite (!); magnetite.

Cane Creek—Gold, in veins; pyrite.

William's mine—Galenite; chalcopyrite.

Battle's Dam—Rose quartz; hematite; manganese; garnet; psilomelane.

Snipes' mine—Magnetite; epidote; chrysocolla; azurite.

Danelly's creek—Gold; pyrite; chlorite.

Elsewhere—Gold, in placers and veins; chalcopyrite, mouth of Rocky river; pinite; halite in brine; amethyst; kaolin.

Cherokee.

Hanging Dog creek—Tourmaline; limonite; staurolite.

Marble creek—Tremolite; talc; calcite (granular), white, pink, grey!

Murphy—Galenite; pyrolusite; limonite (!); wad; tremolite; talc(!); cerussite; at No. Six mine, calcite; tremolite; gold; galenite, (argentiferous).

Nantehaleh river—Nitre in slates; calcite (!), granular, white and pink; talc, massive white.

Parker mine—Staurolite (!); gold; garnet.

Peachtree creek—Hematite; garnet; biotite; limonite; asbestos; red ochre; talc.

Valley river—Hematite; phlogopite; talc; calcite (granular); dolomite; yellow ochre; limonite; gold, in placers; staurolite; corundum in cyanite, half way between Murphy and Valleytown.

Brasstown creek—Gold in veins and placers; calcite; limonite.

Notteley river—Limonite; calcite; talc; staurolite; garnet.

Elsewhere—Gold in placers; garnet in talcose slates; cyanite, more or less altered into damourite; staurolite (!); also pseudomorphs of damourite (?) after staurolite.

Chowan.

Catcite, in marl beds.

Clay.

Cullakenee mine—Corundum (!) white, grey, pink and ruby, frequently altered into other minerals; spinel (!), rare; chromite! drusy quartz;

black hornblende or arfvedsonite (!); smaragdite (?); chrysolite (!); zoisite (!); andesite (!); labradorite (!) orthoclase (!); tourmaline; serpentine, massive and variety picrolite (!); willcoxite; margarite (!!); talc.

Shooting creek—Corundum (!); pseudomorphous quartz after feldspar (?); actinolite; chrysolite; talc; prochlorite; willcoxite (!); margarite; rock crystal; magnetite; cyanite; damourite; gold in placers; rutile in black crystals.

Tusquittah creek—Gold in placers and veins; staurolite.

Tipton's—Corundum; cyanite (green); muscovite.

Cleaveland.

Whiteside mine—Gold in placers.

Mountain mine—Rock crystal (!); tourmaline (!); gold garnets. Gold in placers; graphite; arsenopyrite; galenite; muscovite (!); melanterite; alunogen; pyrite, abundant in gneiss and mica schists; tourmaline.

Cleaveland Mills—2 miles distant, limonite.

Shelby—Within a few miles, muscovite in large plates; magnetite; actinolite; tourmaline.

Columbus.

Calcite in marl beds; near Whiteville, in crystals.

Craven.

Calcite, in marl beds; glauconite, in greensand.

Cumberland.

Petrified wood, Fayetteville; calcite in marl bed; lignite, limonite.

Currituck.

Calcite, in marlbeds.

Dare—(None.)

Davidson.

David Beck's mine—Tetradymite var. 2 (!) montanite (!).

Boss' mine—Galenite, coarse grained.

Conrad Hill—Chalcopyrite; hematite; limonite; siderite; malachite.

Allen mine—Gold; pyrite; chalcopyrite; arsenical pyrite; tetradymite.

Emmons' mine—Chalcopyrite; pyrite.

Loftin mine—Chalcopyrite; pyrite.

Miller's mine—Sphalerite; chalcopyrite.

Harris' mine—Gold: pyrite; chalcopyrite.

Moore's mine—Galenite; pyrite; calcite.

Silver Hill—Silver (!); argentite; highly argentiferous galenite (!); sphalerite (!); chalcocite; pyrite; chalcopyrite; cuprite; melaconite; zoisite (?); orthoclase (!); calamine; pyromorphite (!!); green, yellow, brown, back and colorless wavellite (!); stolzite (!); anglesite (!); goslarite; chalcanthite (!); calcite; cerussite (!!) in fine crystals, massive and in pseudomorphs after pyrite; malachite.

Silver Valley—Galenite; sphalerite; pyromorphite.

Uharrie river—Sphalerite.

Russell mine—Gold; pyrite.

Ward's mine—Gold; electrum (!); pyrite; chalcopyrite.

Delk mine—Gold; limonite; hematite; pyrite.

Laughlin mine—Gold; limonite; hematite; pyrite.

Miller mine—Gold; pyrite: limonite; hematite.

Brown mine—Gold; pyrite.

Midway—Gold; pyrite; chalcopyrite; chalcedony.

Lick creek—Meteorite.

Elsewhere—Gold, in veins and placers; titaniferous magnetite.

Davie.

Magnetite; hematite, in several localities in beds; calcite, granular, on Yadkin river.

Duplin.

Calcite, in marlbeds; limonite; glauconite; pyrite; lignite.

Edgecombe.

Vivianite, in marl; limonite; glauconite; pyrite; ligite; kaolinite, near Battleboro; calcite in marl beds.

Forsythe.

Pfaff's quarry—Calcite, granular.

Near Salem—Magnetite, 4 miles S.; manganese garnet; halloysite; hematite.

Near Kernersville—Enstatite, var. bronzite; chrysolite; tourmaline; magnetite; hematite; chlorite.

Brookstown—Calcite; tremolite.

Elsewhere—Titaniferous magnetite (!); gold; also pure magnetite (!); serpentine.

Franklin.

Portis mine—Gold in placers (!); diamond (!); muscovite, in large plates; magnetite; asbestos; tabular quartz.

Gaston.

Asbury's mine—Silver; tetradymite; galenite; pyrrhotite; pyrite; leucopyrite; auriferous arsenopyrite; bismite; scorodite; montanite; cerussite; bismutite (!).

Cansler & Shuford mine—Gold (!); galenite.

Clubb's mountain—Corundum, red and blue (!), also mammillary (Dr. Hunter); rutile (!!); tourmaline, granular and fibrous; leopardite; cyanite (!); pyrophyllite (!); damourite (!); lazulite (!); talc; quartz crystals; margarite; hematite; muscovite; manganese garnet; magnetite; gold.

Crowder's mountain—Corundum, red and blue (!), also variety emery; rutile (!) in crystals and granular; gold; menaccanite; cyanite (!); topaz (?); pyrophyllite (!); damourite (!); monazite; lazulite (!); barite, with galenite (argentiferous); hematite; limonite; sphalerite; tourmaline; pyrite; chalcopyrite; manganese garnet.

Yellow Ridge—Magnetite.

Stowe's Factory—Magnetite.

Sloan mine—Gold; pyrite.

High Shoals—1 mile above, granular calcite.

Beck's—Pyrolusite; manganese garnet.

Ellison ore bank—Hematite; magnetite; chlorite; orthoclase; epidote.

Ormond ore bank—Limonite, compact and fibrous; psilomelane, niccoliferous.

Mountain mine—Hematite, mamillary and cellular; pyrolusite.

King's Mountain—Gold; galenite; altaite; chalcopyrite; sphalerite; tetrahedrite; nagyagite; magnetite; bismite; calcite; dolomite, pyrrhotite; chalcopyrite.

Long Creek mine—Niccoliferous psilomelane (?); gold; pyrite; fluorite; sphalerite; mispickel; galenite.

Duffie mine—Gold; pyrite; chalcopyrite; also at B. Well's mine.

Oliver mine—Gold; silver; galenite.

White's mills—Epidote; biotite; orthoclase! pycuite; titanite.

Wells' farm—Magnetite; hematite; pyrite; rutile; garnet; zircon (?); beryl; tourmaline; monazite, asbestos; mennaccanite; azurite; bornite (?).

Rhodes mine—Gold; also at Derr mine, Smith mine, Farrar mine, Beattie mine, McLean mine, High Shoals mine, Cannon mine.

Ferguson mine—Magnetite; pyrite.

Elsewhere—Gold in placers and veins; sulphur; pyrite; magnetite; calcite, compact and granular; siderite.

Gates.

Calcite, in marl beds.

Graham.

Gold; calcite, granular, white and flesh colored; talc; pyrite.

Granville.

Near Henderson—Talc; chalcopyrite; pyrite.

Young's X Roads—Gold; pyrite.

Near Oxford—Magnetite; limonite; epidote; hematite; gold.

Lignite, on Tar river near Crews'.

Knapp of Reeds—Joe Woods', hematite; magnetite; red jasper; steatite.

Sassafras Fork—Gold; pyrite; a few miles north, malachite; tourmaline; quartz crystals; agate.

Near Shiloh church—Epidote; labradorite; calcite.

Greene.

Limonite; siderite; glauconite; calcite, in marl.

Guilford.

Cambridge mine—Chalcocite; pyrite (!); chalcopyrite; barnhardtite; chrysocolla; malachite.

Fisher Hill—Gold; pyrite; chalcopyrite; magnetite; hematite; menaccanite; limonite; pseudomalachite; siderite.

Beard M.—Gold.

Friendship—Granular corundum (emery); titaniferous magnetite.

Gardner Hill—Bornite (?); chalcopyrite; chryscolla; malachite.

Greensboro—Hornblende at Polecat creek; pyroxene; pyrite; 5 ms. west, gold; pyrite; chlorite; 9 ms. s., kaolinite, and 6 ms. west.

Near Alamance church—Kaolinite.

McCulloh mine—Copper; cuprite in acicular crystals (!); pyrite; chalcopyrite; siderite; malachite.

Near Jamestown—Gold; pyrite; steatite.

North Carolina (Fentress) mine—Cuprite in acicular crystals (!); pyrite; chalcopyrite; siderite; malachite.

Phœnix mine—Chalcopyrite; covellite.

Elsewhere—Gold in veins; meteoric iron; molybdenite; limonite; rock crystal; pyrite; manganese garnet; magnetite; asbestos in green quartz (!), (Humphrey's), titaniferous magnetite, with hematite and limonite, chlorite, in a double range of outcrops, of 20 miles length, across the n. w. section of the county, from the head of Deep river, on the Forsythe line, to the Rockingham line, near the Piedmont railroad at Haw river.

Halifax.

Near Ransom's Bridge—Gold in placers; pyrite.

Fishing Creek—Magnetite crystals and cubical pyrite in slate.

Gaston—Hematite, micaceous and granular; magnetite; chlorite; limonite; 6 miles south, Hines' place, hematite; magnetite.

Elsewhere—Petrified wood; epidote; zircon and garnet, in gold gravels; calcite and glaucouite in marl.

Harnett.

Harrington—Calcite, granular.

Near Buckhorn—Hematite.

Northington's Dam—Chrysocolla; calcite, in gneiss rock.

Little river—Magnetite, several places.

Elsewhere—Kaolinite; talc; magnetite.

Haywood.

Big Ridge mine—Muscovite; biotite; tourmaline; apatite; margarodite; menaccanite.

Waynesville—2 miles above, talc; asbestos; tremolite; on Richland creek, 2 miles below, psilomelane; garnet; limonite; damourite.

Hall's mine—Chrysolite; corundum; talc; chlorite; tremolite.

Presley mine—Corundum, blue and grey, altered into damourite and albite; albite; damourite in large crystals, also in scales crypto crystalline and compact.

Wilkins' Creek—Magnetite with limonite; chalcopyrite; pyrite.

Cove Creek—Psilomelane; limonite.

Pigeon River, east fork—Corundum; pyrrhotite.

Pigeon River, west fork—At Sorrell's mine, niccoliferous (?) pyrrhotite.

Johnathan's Creek—Cyanite; pyrrhotite; graphite; garnets.

Henderson.

Coleman's Station—Zircon; phlogopite; jefferisite.

Green River—On south side of Blue Ridge, at Freeman's, zircon; xanthitane; calcite, granular.

Elsewhere—Beryl; limonite; hematite; vermiculite; meteoric iron.

Hertford.

Calcite, in marl beds.

Hyde—(None.)

Iredell.

Bell's Bridge—Pyrite in soapstone; corundum! in globular masses, partly altered into damourite, &c.; at Hendrick's farm, corundum in hexagonal crystals! partly altered into margarite; actinolite; orthoclase; tourmaline; damourite! soda-margarite at Hendrick's farm.

Center Point, at Beam's farm—limonite (!) pseudomorphous after nodular pyrite.

Crawford's farm—Quartz pseudomorphous after calcite.

Damascus—Menaccanite.

Dr. Halyburton's—Cucopyrite (!); scorodite.

King's Mill—Graphite (!); hematite in hexagonal plates in quartz; rutile (!); in quartz, at Mrs. Jordan's, Alex. Lackey's, Misses Bennett's, Thomas Adams' and Mrs. Smith's farms; rock crystal (!); quartz crystals inclosing liquid (!); chalcedony; tourmaline (!).

Mount Pisgah—Rutilated quartz (!) at Mrs. Daniel's farm; chloritic mineral resembling thuringite.

Spring Mountain—Graphite (!).

Statesville—6 ms. E., talc, with actinolite; 2 ms. West, corundum (!) rarely altered into cyanite! orthoclase (!) on Houp's farm; cyanite (!) 2 ms. W. and 6 ms. S. W. of Statesville on Hoover's farm, with damourite (!); 4 miles distant, goethite in thin scales, in light red feldspar.

Bethany Church—Allanite, with small crystals of zircon.

Elsewhere—Marcasite; magnetite near Comb's, and on South Yadkin river.

Jackson.

Cullowhee mine—Chalcocite; pyrite; melaconite; chalcopyrite (!); hornblende; malachite.

Hogback mine—Corundum (!); rutile in corundum, rare; chromite; drusy quartz; chrysolite (!); andesite (!); tourmaline; damourite (!); dudleyite; margarite (!).

Savannah mine—Chalcopyrite: hornblende; tourmaline; malachite.

Horse Cove—Muscovite; beryl.

Tennessee Creek—Tremolite; grammatite; chlorite; actinolite.

Waryhut mine—Chalcocite; chalcopyrite; cuprite; malachite.

Georgetown and Fairfield—Gold in places.

Webster—Corundum; chromite; pyrolusite; wad; chalcedony; drusy quartz; enstatite (!); tremolite (!); actinolite (!); asbestos; chrysolite (!); talc (!); serpentine; marmolite; deweylite; genthite; penninite (!); magnesite (!) crystalline and earthy.

Wolf Creek mine—Chalcocite; native copper; chrysocolla; chalcopyrite; malachite.

Ainslie's—Chrysolite; chromite; talc; chlorite; enstatite; smaragdite (?) asbestos; tremolite; garnet; actinolite; albite.

Scott's Creek—Chrysolite; chromite; talc; penninite; (var. kæmmererite); enstatite; chlorite; corundum, (blue and pink.)

Toxaway river—Calcite, granular.

Casher's Valley—Gold in placers; chalcopyrite; pyrite.

Elsewhere—Gold in placers; psilomelane; calcite; asbestos; talc; limonite; muscovite in many mica mines; galenite.

JOHNSTON.

Fossil wood; limonite in many places near Smithfield; chloritic talc slate near Clayton; kaolinite; magnetite; pyrite; tourmaline; graphite; epidote; muscovite; quartz crystals; hematite.

JONES.

Calcite, in marl beds; limonite.

LENOIR.

Calcite, in marl beds; glauconite, in greensand marl.

LINCOLN.

Lincolnton—Calcite; 12 ms. N. W., reticulated acicular rutile; kaolinite; graphite; limonite, 7 ms. N. W. and 2 ms. east.

Brevard's Forge—1½ miles from Vesuvius furnace, magnetite (!); manganese garnet; quartz crystals.

Cottage Home—Diamond (!); gold; chalcopyrite.

Macpelah Church—Manganese garnet; pyrite and chalcopyrite, 2 miles east.

Randleman's—quartz crystals; amethyst (!).

Stowe's Quarry—Calcite, granular and compact.

Elsewhere—Gold in placers and veins; sulphur; graphite; hematite; magnetite; limonite; muscovite; kaolinite; epidote; pyrite; calcite, near Lincolnton (!); asbestos; chalcedony; garnet; psilomelane; talc; cuprite; cyanite, blue and red; galenite; graphite; limonite; menaccanite; actinolite.

Macon.

Houston's mine—Muscovite; corundum; talc; tremolite; chlorite; tourmaline.

Lyle's mine—Muscovite; biotite; kaolinite.

J. Moore's—Chromite; corundum.

Thorn Mt. mine—Muscovite; biotite; margarodite; manganese garnet; albite; uranochre; zippeite; beryl; pyrrhotite; chalcopyrite.

Culsagee mine or *Corundum Hill*—Corundum (!) in beautiful varieties in crystals and massive, and frequently in part altered into other minerals; chromite (!); spinel (!) in crystals and granular; rutile (!), rare; diaspore (!) one specimen only known; drusy quartz (!) and quartz crystals; chalcedony; hyalite (!); enstatite (!); tremolite; arfredsonite (!); chrysolite (!); andesite (?); oligoclase; tourmaline (!); talc; serpentine (!); deweylite (!); cerolite; genthite (!); culsageeite (!); kerrite (!); maconite (!); penninite (!); prochlorite (!); willcoxite (!); margarite (!); anthophyllite; actinolite; magnetite.

Near Franklin—Sphalerite; chalcopyrite; menaccanite (!); wad; garnet (!); epidote (!); fibrolite (!); cyanite (!); staurolite (!); kaolinite (!); rhodochrosite.

Haskett's—Limestone quarry; magnetite; corundum (!), in part altered into damourite; tourmaline; calcite; garnet; molybenite.

Jacob's mine—Corundum; asbestos; tremolite; chrysolite.

Sugartown creek—Chromite; tremolite; actinolite; asbestos; chrysolite; garnet; biotite; orthoclase; magnetite; hematite.

Nantehaleh River—Asbestos; fibrous talc at Jarrett's; black hornblende; calcite.

Tennessee River, below Franklin—Garnet; staurolite; cyanite; damourite; columbite.

Whiteside Mt.—Tremolite; orthoclase; actinolite; garnet; chalcopyrite; magnetite; asbestos.

Ellijay Creek—Near Higdon's; corundum: chlorite; asbestos; chromite; magnetite; hematite; garnet; chrysolite; at Goshen, calcite, granular; coccolite; graphite.

Highlands—Gold; rose quartz.

Catoogajay Creek—Magnetite, at Sloan's.

Elsewhere—Graphite; garnet; chalcopyrite; magnetite; hornblende, 23 miles below Franklin; beryl; rose quartz; magnetite; muscovite and biotite in numerous mica mines; gold and galenite in Cowee mountains.

Madison.

Bear creek—Magnetite (!), two miles from mouth; green coccolite, in granular calcite; chlorite; epidote; cyanite; staurolite; talc; garnet, (large crystals).

Big Laurel—Magnetite (!); menaccanite (!); milky quartz; pyrite; calcite, granular and massive.

Carter's mine—Corundum (!!) in peculiar white and pink varieties; spinel (!); chromite; hornstone; drusy quartz; tremolite; chrysolite (!); andesite (!); prochlorite (!); culsageeite; menaccanite; beryl!

French Broad river—Orthoclase; calcite, with coccolite; limonite, in heavy bed, near state line.

Jewell Hill—Meteoric iron (!); ferrous chlorite in meteorite; hematite.

Near Marshall—Calcite; galenite; bornite; chalcopyrite; epidote; fluorite; hematite, near Gudger's 9 miles below M.; corundum (!), 3 miles below M.; diaspore (?); prochlorite (!); margarite; barite, at Chandler's, 9 miles below M.; 4 miles west of M., smoky quartz, in doubly terminated crystals.

Walnut creek, near French Broad river—Green coccolite, in calcite; phlogopite.

Warm Springs—Slaty damourite (!); calcite; red jasper; pyrite; psilomelane; gold, in veins and placers.

Shut In creek—Calcite; jasper.

Spring creek—Magnetite, in large bed, massive.

Ivy river—2 miles from mouth, Smith mine, magnetite; pyroxene; at Radford's, hematite and magnetite.

Brush creek—Magnetite, at Freeman's and Sikes'; coccolite in calcite.

Haynie mine—Blue corundum; rulite; margarite; green crystals of hornblende; magnetite; chlorite; menaccanite.

Martin.

Calcite, in marl beds.

McDowell.

Cedar Cove, at Dodson's mine—Sphalerite; calcite, granular and compact.

Kirksey's mine—Tetradymite.

Linville Mountains—Itacolumite; radiated pyrophyllite; limonite, in many places; hematite; calcite, granular and compact, several places.

Turkey Cove—Calcite, granular and compact.

Turkey creek—Bee rock, epidote (!); tourmaline.

In the gold placers—Gold; corundum; menaccanite; rutile; chromite; brookite; pyrope; zircon (!); epidote; fibrolite; pyromelane; xenotime (!); monazite (!); diamond; anatase.

Marion—Within a few miles, limonite; manganese garnet; psilomelane.

Round Knob—Cyanite; garnet; paragonite.

Grave Yard mountain—Hematite; limonite; calcite.

Head of Tom's Creek—Magnetite; muscovite; kaolinite.

Elsewhere—Limonite; calcite; sarmarskite.

Mecklenburg.

Beattie's Ford—Rutile! in acicular crystals.

Capp's Hill—Magnetite; gold; pyrite; chalcopyrite.

Charlotte—Orthoclase var. leopardite (!); at the Rudisill mine, gold pyrite; chalcopyrite; white siderite; 2 miles from Charlotte, pyrite; chalcopyrite; magnetite, fine granular.

Davidson College—Radiated cyanite; pyrophyllite; gold; agate, 5 ms. south at D. Caldwell's; hematite at Gibson's, 5 miles from D. College; 7 miles south, fine crystals of rutile; 12 miles southwest, granular hematite.

Hopewell mine—Chalcopyrite; chrysocolla; pyrite.

McGinn mine—Gold; pyrite; chalcopyrite; barnhardtite; cuprite in acicular crystals; melaconite; pseudomalachite!

Old Harris mine—Hematite; menaccanite.

Providence—12 miles south of Charlotte, chalcopyrite; gold; pyrite; magnetite.

Todd's Branch—Gold; diamond (!); zircon (!); garnet; monazite!

Tackasegee Ford—Epidote; labradorite near T. Ford.

Stephen Wilson's mine—Gold; pyrite; chalcopyrite; siderite.

Gibson mine—Gold; also at Jordan mine, Brown mine, Carson mine, Icyhour mine, Burnett mine, Neal mine, Brawley's mine.

Roswell mine—Gold; pyrite; also at Stearne's mine, Rogers' mine, Stinson mine, Crosby mine, Johnson mine, Juggernaut mine, Frazer mine, Taylor mine, Maxwell mine, Nolen mine, Crump mine, Bane mine, McCorcle mine, Hunter mine, Henderson mine, Alexander mine, J. Alexander's mine, Caldwell mine, Davidson & Blake mine.

Sugar Creek—Magnetite.

Faire's mine—Gold; pyrite; chalcopyrite.

Frederick mine—Gold; pyrite; chalcopyrite; chrysocolla; malachite.

Maxwell mine—Gold; pyrite; chalcopyrite; also at Clark's mine, Ray mine, Hipp mine, Trotter mine, Harris mine, Henderson mine, Kern mine, Cathey mine, G. C. Cathey's mine, Sloan mine, McLean mine, Charlotte mine, and Queen mine.

Elsewhere—Gold, in placers and veins; copper in quartz crystals; sulphur; magnetite, near Steele creek church; foliated hematite at Sol. Reid's; tourmaline.

MITCHELL.

Toe River Ford—Actinolite, large crystals in talc; muscovite.

Pumpkin Patch Mt—Labradorite.

Bakersville—2½ ms. S. of B., chromite (!); saponite; quartz crystals; chalcedony (!); enstatite (!); tremolite; actinolite; chrysolite (!); talc; rutile, penetrating corundum; serpentine; deweylite; penninite (!); magnesite; 1½ miles S. E., asbestos; talc; limonite; corundum; 2 miles S. E., limonite; psilomelane.

Blalock's—Garnet; muscovite (!); orthoclase (!); kaolinite.

Buchanan mine—Gummite; yttrogummite (?); asbestos; beryl;

allanite (!); muscovite (!); albite (!); phosphuranylite (!); cyanite; graphite; manganese garnet; black garnet.

Cane Creek—menaccanite (!); actinolite; talc; asbestos; near head, graphite; rutile; garnet.

Crab Orchard—Menaccanite (!).

Autrey's—On Brush creek, quartz crystals, smoky; black garnet; koalinite.

Canberry—Magnetite (!); pyroxene; epidote.

Deake mine—Quartz, flattened out between muscovite; muscovite (!); columbite (!); gummite.

Flat Rock—Menaccanite (!); uraninite (!); gummite (!); zircon; garnet; epidote; zoisite, var. thulite (!); muscovite (!); pink muscovite (!); albite (!); orthoclase (!); uranotil (!); phosphuranylite (!); autunite (!).

Grassy Creek—Samarskite; menaccanite; kaolinite; beryl, large; muscovite; autunite; margarodite; hyalite.

Point Pizzle—Albite (!); apatite (!); pyrophyllite; actinolite; beryl; garnet; manganese garnet.

Old Fields of Toe—Miller's Gap, epidote; talc; chlorite.

Unaka mts.—Magnetite (!); zircon (!); epidote; hematite.

Wiseman mine—Muscovite(!); kaolinite; hatchettolite(!); columbite !); samarskite (!); euxenite (!); rogersite (!)

Gillespie Gap—Psilomelane; monazite.

Pumpkin Patch Mt.—Magnetite; labradorite; garnets.

Burlison's—Asbestos; actinolite; talc.

Lick Ridge mine—Muscovite; albite; garnet, red and black; biotite; pyrite; chalcopyrite.

Cox mine—Smoky quartz; manganese garnet; albite; autunite; muscovite; biotite; apatite; labradorite; pyrite.

Elsewhere—Galenite (!); rutile; garnet; epidote; fergusonite: actinolite, (S. Blalock's); æschinite; rock crystal; muscovite; kaolinite in numerous mica mines.

Montgomery.

Cheek's creek—Fossil wood.

Cottonstone Mountain—Pyrophyllite ! !

Crump mine—Gold (!) in placers.

Christian mine—Gold in placers.

Steele mine—Gold (!!); galenite; sphalerite; chalcopyrite; albite; prochlorite; calcite.

Burnett Mountain—Gold in placers.

Swift Island mine—Gold!!

Beaver Dam mine—Gold in placers.

Elsewhere—Gold in veins and placers; argentite in slates; magnetite.

Moore.

Carthage, 12 miles east—Hematite.

Cheek mine—Chalcopyrite; malachite; azurite; galenite; red jasper; epidote; talc; calcite; argentite.

Soapstone Quarry—Slaty pyrophyllite (!); pseudomalachite.

Upper Lit. river—Cyanite.

Welch's—Chrysocolla; chlorite.

Elsewhere—Gold in veins and placers; pyrite; fossil wood; at E. Kelly's, limonite; at P. Martin's, agate; at J. Dunlap's, quartz crystals; at Johnson's Mill, acicular hornblende in quartz.

Nash.

Tom Arrington mine—Gold in placers.

Portis mine—Gold in placers.

Mann mine—Gold in placers.

Elsewhere—Gold in placers; meteoric stone; crocoite (!); hematite; limonite; calcite, in placers.

New Hanover.

Calcite (!), granular and crystalline; lignite; glauconite; limonite.

Northampton.

Calcite, in marl beds.

Onslow.

Calcite, in marl beds.

Orange.

Chapel Hill—Hematite (!); limonite; epidote; near C. H., chalcopyrite; pyrite; magnetite; serpentine; hematite, pseudomorphous after pyrite.

Hillsboro—pyrite in cubes; pyrophillite (!); chlorite in fine scales; epidote; barite (!), at Latta mine; braunite; hematite, 6 miles south; pyrite; chalcopyrite.

Eno river—Serpentine; steatite.

Elsewhere—Halite in brine; micaceous hematite at Flat river; epidote; hematite, pseudomorphous after pyrite; serpentine; moss agate; slaty pyrophyllite.

Pamlico.

Calcite, in marl beds.

Pasquotank—(None).

Pender.

Calcite; glauconite; limonite.

Perquimans—(None).

Person.

Mt. Tirzah—Hematite, micaceous; menaccanite.

Barnett mountain—White cyanite (!).

Dillahay's mine—Gold; radiated quartz.

Gillis' mine—Chalcocite; pyrite; covellite; micaceous hematite; chrysocolla; cuprite; malachite; calcite.

Mill creek—Chalcocite; chrysocolla.

Harris' mine—Copper in epidote.

Woodsdale—Gold in vein; pyrite.

Elsewhere—Graphite, on Hico and on Cane creek; limonite; steatite; talc; hematite; magnetite.

Pitt.

Calcite; glauconite; siderite; limonite, in beds near Tranter's creek; succinite.

Polk.

Sandy Plains—At Davis' mine, gold; limonite; pyrite. At Morris' mine, gold; monazite; pyrite; epidote; asbestos; tourmaline. At Prince mine, monazite; rutile; zircon.

Morrill Mills' gold mine—Euclase (!).

Hungary river—Gold, in placers.

Pacolet river—Gold, in placers.

Elsewhere—Gold in placers; monazite; xenotime; rutile; epidote; quartz crystals; manganeze garnet; turgite.

Randolph.

Pilot Knob—Pyrophillite (!); gold, in placers; acicular rutile in quartz.

Hoover Hill mine—Gold; galenite; calcite.

Kinley mine—Gold; pyrite.

Jones mine—Gold; pyrite; limonite.

Parish mine—Gold; talc; tremolite; actinolite.

Elsewhere—Gold in veins and placers; meteoric iron (!); magnetite; siderite; hematite, (micaceous).

Richmond.

Hitchcock creek—Orthoclase (!); oligoclase.

Hamlet—Kaolinite.

Elsewhere—Pyrophyllite, in quartz schists; chlorite.

Robeson.

Calcite, in marl beds; kaolinite.

Rockingham.

Madison—Chalcopyrite at W. Lindsay's; manganese garnet.

Leaksville—Semi-bituminous coal.

Smith's river, 2 miles E. of Morehead's factory—Hematite; gold; asbestos.

Troublesome creek—Magnetite; hematite; limonite.

Smith's mountain—Meteoric iron (!!) with schriebersite and ferrous chloride.

Reidsville—Magnetite, 6 miles N.

Elsewhere—Halite in brine; titaniferous magnetite (!); garnet; cyanite.

Rowan.

Gold Hill—Gold (!); bismuthinite; pyrite; chalcopyrite; arsenopyrite (!) at Honeycutt's; magnetite.

Salisbury—Orthoclase (!) 7 miles S., Gold Hill road, pyrite; chalcopyrite; chrysocolla; talc.

Yadkin mine—Gold; pyrite.

Dunn Mountain mine—Gold; pyrite; chlorite.

Snider mine—Gold; pyrite.

Grupy mine—Chalcopyrite; pyrite; chrysocolla.

Cope mine—Gold; also at Rymer M., Haynes M., Cady M., Bringle M., Trexler M., Yadkin M., Bane M., Roseman M., Earnhardt M., Holtshauser M., in veins and placers.

Elsewhere—Orthoclase in large and twin crystals; gold; pyrite.

Rutherford.

Brindletown creek—Diamond (!).

Jeanstown—Platinum; palladium (!); at Weaver's, garnet; epidote; pyrope; tourmaline; gold; manganese garnet.

Rutherfordton—Quartz, pseudomorphous after calcite (!).

Shemwell mine—Arborescent gold (!).

Second Broad river—Head of it, gold in veins and placers; pyrite.

Twitty's mine—Diamond (!).

At the Gold Placers generally—Gold; corundum in grains and crystals; menaccanite; rutile; chromite; brookite; rock crystal; pyrope;

zircon (!); epidote; samarskite; rutherfordite; xenotime (!); monazite; wolframite (?)

Elsewhere—Amethyst; melanterite; alunogen; fergusonite; anatase; dark gray corundum; fibrolite; tourmaline; gold; pyrite.

Sampson.

Calcite in marl beds; lignite.

Stanley.

Hearne mine—Gold; pyrite; chalcopyrite; calcite; chlorite; serpentine.

Crowell mine—Gold.

Elsewhere—Gold in veins and placers.

Stokes.

Coffee Gap—Lazulite (!) with damourite in quartz.

Danbury—Magnetite (!); pyrolusite; actinolite; cyanite! 6 ms. E. of D.; titanite (Rogers' ore bank).

Dan river—Opalescent quartz; anthracite and bituminous coal.

Germanton—Fossil wood!; at Bolejack's quarry, actinolite(!); phlogopite; granular calcite; 2 miles E. of G., serpentine; calcite.

Moore's mill—Manganese garnet.

Peter's creek—Sulphur!

Sauratown mountain—Itacolumite (!); asbestos.

Snow creek—Hematite, at Martin's quarry; chalcedony; hornstone; phlogopite; granular calcite; agate; amethyst; hyalite; jasper.

Stokesburg—Rock crystal; anthracite and bitumous coal.

Elsewhere—Copper; graphite; chalcopyrite; muscovite in pyrite; siderite; tourmaline; talc; muscovite (large plates); epidote; limonite; calcite, granular, on Little Yadkin and Dan rivers.

Surry.

Dobson—10 miles north, manganese garnet; pyrolusite; talc, green crystals; serpentine; steatite; actinolite; breunerite; magnesite; magnetite; chlorite; hausmannite; wad.

Ararat river—4 ms S. E. of Mt. Airy, pyrite!; magnetite!; garnet white cyanite!

Chestnut mountain—Octahedral magnetite!

Fisher's Peak—Octahedral magnetite.

Pilot mountain—Talc!

Tom's creek—Magnetite.

Rockford—Steatite.

War Hill—Milky quartz.

Williams' mine—Magnetite.

Elkin—10 ms. north, limonite; hematite; 5 ms. northeast, pyrite; chalcopyrite; chrysocolla.

Elsewhere—Graphite; tourmaline; garnets; magnetite; limonite; chalcopyrite; sulphur; galenite; pyrrhotite; pyrite; psilomelane; asbestos.

Swain.

Oconaluftee river—Gold; galenite, argentiferous; pyrite; chalcopyrite.

A. Nichols—Pyrolusite; chalcocite; tourmaline.

Quallatown—Gold, in placers.

Elsewhere—Itacolumite; magnetite; hematite; limonite; talc.

Transylvania.

Boyston river—Gold in placers; granular calcite; limonite.

Davidson river—Chalcopyrite; pyrite.

Mills' river—Calcite.

Brevard—Chlorite: graphite.

Elsewhere—Pyrite; chalcopyrite; rose quartz; pyrrhotite; tourmaline; graphite.

Tyrrell—(None.)

Union.

Lemmond mine—Gold (!); electrum (!); galenite; sphalerite; pyrite; arsenopyrite; pyromorphite.

Long mine—Gold; galenite.

Moore's mine—Gold; sphalerite; pyrite; chalcopyrite; galenite.

Pewter mine—Electrum.

Phifer mine—Gold; silver; galenite; also at Lewis m., and Washton m.

Stewart mine—Gold (!); electrum (!); galenite; sphalerite; pyrite; arsenopyrite; pyromorphite.

Union mine—Gold, also at Davis m., Dulin m., Fox Hill m., Crump m., Cureton m.

Walkup's mine—Barite (!), granular.

Smart mine—Gold; pyrite; chalcopyrite; galenite; sphalerite.

Elsewhere—Gold, in veins and placers.

Wake.

Barton Creek—Pyrite, large cubes; hematite, pseudomorphous after pyrite; tourmaline; chlorite; margarodite.

Brassfields—Calcite; chalcedony.

Witherspoon's—Granular calcite.

Wyatt's—Limonite.

Cary—Pyrite; hematite; martite.

N. W. corner of county—Serpentine; asbestos; actinolite; steatite; cyanite.

Soapstone church—Talc; asbestos; serpentine.

Morrisville—Granular calcite.

Raleigh—Menaccanite (!); epidote; hematite; magnetite; muscovite; paragonite; near R., chalcopyrite; pyrite; graphite.

Elsewhere—Graphite (!); pyrite; magnetite; amethyst; tourmaline; biotite; calcite.

Warren.

Ransom's Bridge—Gold; garnet.

Elsewhere—Quartz crystals; magnetite; epidote; gold, in placers; garnets.

Washington.

Calcite, in marl beds.

Watauga.

Beech mountain—Fine grained galenite (!); pyrite; at Pogie, galenite.

Cooke's Gap—Arsenopyrite; hematite (!); magnetite (!); itacolumite (!); limonite; martite.

Cove creek—Magnetite; limonite.

Rich mountain, head of Cove creek—Chromite; quartz crystals; actinolite; chrysolite; epidote; penninite; tremolite.

Beaver Dam creek—Magnetite.

Elk Knob—Pyrite; chalcopyrite; pyrrhotite; epidote; limonite; garnet.

Miller mine—Pyrite; chalcopyrite; limonite.

Watauga river—Calcite; epidote; chlorite.

Elk river—Jasper; epidote; chlorite; calcite.

Hardin mine—Gold, in placers.

Boone Fork—Quartz crystals, (fine.)

Elsewhere—Gold in placers; galenite; fluorite; epidote; limonite; magnetite; cyanite; talc; chromite; chlorite; menaccanite; asbestos.

Wayne.

Fossil wood; lignite; pyrite; calcite, in marl beds.

Wilkes.

Wilkesboro—2 ms. north, serpentine; talc; garnet.

Mulberry river—Magnetite.

Blue Ridge—3 ms. S. of, on road to Jefferson, garnet; orthoclase; apatite.

Bending Rock mountain—Itacolumite.

Roaring river—Magnetite.

Elk creek—Galenite; cerussite.

Flint Knob—Galenite (agentiferous); pyrite.

Elkin creek—barite; limonite; galenite; cerussite.

Honey creek—Rutile (!) in acicular crystals in brownish amethyst.

Elsewhere—Graphite; corundum (!) mostly altered into cyanite: pyrite; cyanite (!); mixture of damourite, margarite, &c., resulting from the alteration of cyanite.

Trap Hill mine—Galenite; pyrrhotite; chalcopyrite (auriferous); pyrite; rutile; garnet; tourmaline; magnetite.

Reddie's river—Serpentine.

Wilson.

Calcite, in marl beds; limonite.

Yadkin.

Near Yadkinville—Gold.

Boyden's quarry—Calcite, compact and granular.

Campbell mine—Magnetite.

Hobson's mine—Magnetite; tremolite; magnetite (!) at East Bend and elsewhere.

Near Forks of Yadkin river—Calcite.

Jonesboro—Pyrite in cubes in slates; chalcopyrite.

Yancey.

Bald Mountain—Grayish green actinolite; magnetite.

Burnsville—Platinum (?); labradorite (!) 6 ms. N. of B; tourmaline at Parrot's Ford, 3 ms. from B; tantalite (!).

Hampton's, Mining creek—Chromite (!); chalcedony; enstatite; tremolite (!); actinolite; asbestos; chrysolite (!); orthoclase; talc (!); serpentine; deweylite; penninite; magnesite; epidote, in fine green crystals; bronzite.

Hurricane mountain—cyanite (!); titanite; damourite.

Bald creek—Chrysolite; talc; asbestos; serpentine; tremolite; chlorite; pyrite; actinolite; epidote.

Ivy river—Menaccanite.

Ray's Mica mine—Fluorite (!), pseudomorphous after apatite; yttrocerite (?); beryl (!); garnet; zircon; rutile; muscovite (!), also a scaly pink variety; orthoclase; tourmaline (!), black and yellowish green; kaolinite; æschynite (!); columbite (?); apatite; monazite, very rare; autunite; amazon stone; cyanite; albite; smoky quartz.

Mitchell's Peak—Cyanite; fibrolite; garnet; tourmaline; biotite.

Young's mine—Enstatite; chlorite; serpentine; chrysolite; chromite; talc; asbestos; tremolite; pyrite; manganese garnet, and garnet crystals; bronzite; tourmaline; muscovite.

Presnell (*Young's*) *mine*—Muscovite; albite; apatite; autunite.

Gibb's mine—Muscovite; albite; garnet; glassy feldspar.

Guggenheim's mine—Muscovite; albite; manganese garnet; apatite; margarodite; hyalite; tourmaline; autunite.

Rocky creek—Muscovite; pyrite; graphite.

Elsewhere—Graphite; allanite; cyanite; columbite; magnetite; on Crabtree creek, massive reddish garnet; rutile; muscovite; in many mica mines, pyrite.

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